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I. C. Caspius

MARCELLI MALPIGHII

Philoſophi & Medici

BONONIENSIS

è Societate Regia

APPENDIX,

Repetitas Auctaſque

De Ovo Incubato

Obſervationes continens.

LONDINI:

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MARCELLI MALPIGHII,
E REG. SOC. ANGLICANA.
ANATOMES PLANTARUM IDEA.

MAGNÆ SOCIETATI REGIÆ ANGLICANÆ

Marcellus Malpighius S. P.

BOnarum artium literarumque incrementis, *Sodales Doctiſſimi*, non eam, ut reor, bellorum clades, populorumque novitates intulere labem, quàm inverſa ſtudiorum methodus, artiumque incongrua electio. Currentis enim ſæculi genio ut plurimùm ſtudia ſeligimus, vel parentum majorumve cæcis legibus ducimur ad artes; quas ubi vix è limine ſalutavimus, cùm totam peripheriam emenſos nos eſſe putemus, longam & accuratam exiguę particulæ indaginem dedignamur; unde perpetuò hæremus in limine. Rerum Natura tenebris obvoluta, cùm ſolo analogiſmo pateat, tota percurrenda venit, ut mediantibus ſimplicioribus machinis, in ſenſum faciliùs occurrentibus, implicatiores retexamus. At quæ graviora ſunt, & perfectiora, utpote humano uſui magis neceſſaria, & exiſtimationis plena, primò hominum ingenia ad ſe rapiunt; tractu tamen temporis, effœto corporis & animi robore, cùm inutilis calcata ſtudiorum ſemita apparet, nova indies perquiritur, quæ inventa, ſenectutis tædio contemnitur, ita ut ſingulorum mortalium labores nullam determinatè perficiant artem, ſed tumultuariè immaturéque quamcunq; aggrediantur. Totum hoc mihi accidiſſe fateor, *Sapientiſſimi Conſocii*: Etenim, fervente ætatis calore, Anatomica aggreſſus, licèt circa peculiaria fuerim ſollicitus, in *perfectioribus* tamen hæc rimari ſum auſus. Verùm, cùm hæc propriis involuta tenebris obſcura jaceant, ſimplicium analogiſmo egent; unde *Inſectorum* indago illico arriſit; quæ cum & ipſa ſuas habeat difficultates, ad *Plantarum* perquiſitionem animum *poſtremò* adjeci, ut diu hoc luſtrato mundo, greſſu retroacto, Vegetantis Naturæ gradu, ad prima ſtudia iter mihi aperirem. Sed nec fortè hoc ipſum ſufficiet, cùm ſimplicior *Minerálium Elementorumque* mundus præire debeat. At in immenſum excreſcit opus, & meis viribus omnino impar. Ut ſeveriores tamen curas, Naturæ contemplatione temperem, hiſtoricè hunc Viventium infimiorem ordinem aggredi eſt animus. Hæc ſunt ea ſtudia, quibus animum elapſis annis detinui, & cùm graviſſima ſint, plenaque am-

bagibus, ideò crudas haſce delineationes eorum, quæ meditor, hic habebitis, ut ſingulis ſincerè penſitatis, vel fœtum hunc legitimum foveatis, vel ut degenerem rejiciatis, mihique rectas Philoſophandi ſemitas indicetis.

Nec, *Viri Doctiſſimi*, exactam & generalem in univerſum plantarum notionem ſub aſſignatis generibus, propriiſque ſpeciebus retexere, & ſingulorum partes recenſere eſt animus, (monebat enim *Theophraſtus*, Plantam rem variam eſſe, inque univerſum de ea referre difficile:) Sed notiores Vegetantium apud nos partes, anatomicâ reſolutione detectas, hiſtoricè, prout licebit, exponam, & quaſdam circa ipſarum Oeconomicum uſum cogitationes addam.

Facilioris itaque intelligentiæ ergò præmiſſis vulgaribus Vegetantium diviſionibus, à notioribus ſenſui exordio ſumpto, arborum *Truncos* primò luſtrabo; & cum ejuſdem *Cortex* occurrat, de eo ſtatim ſermo habebitur. Hic arboribus; & pluribus plantis ineſt, & multiplici partium apparatu conſtat. Exterior etenim *cuticula* utriculis, ſeu ſacculis horizontali ordine locatis, ita ut annulus efformetur, componitur, qui ambientis rigiditate & ſeneſcentis ætatis vitio deplentur, & in ſeipſos collapſi, aridam interdum epidermidem efficiunt, ut in *ceraſis*, *pomiſque* præcipuè obſervatur. Hac detractâ, occurrunt plures, & plures ordines fibrarum lignearum, quæ ut plurimum reticulariter implicitæ ſeſe invicem, cæparum inſtar, amplexantes, trunci longitudinem excurrunt; hac tamen ratione, ut retis ſpatia ſeu areæ, ſenſim in penitioribus & proximioribus ligno fibroſis retibus anguſtiores fiant, ita ut penè obliterentur in *libro*. Fibroſi hujuſmodi faſciculi multiplicibus fibris excitantur, & quælibet fibra inſignis fiſtulis invicem hiantibus conſtat, humoremque fundit, in progreſſu verò alteri unitur faſciculo ad latus inclinata, modò rectà ſurſum exporrigitur, mox obliquata proximo conſociatur faſciculo, & ita fit rete. Intercepta retis ſpatia replentur utriculis ſeu ſacculis ſubrotundis, quin & totus fibrarum faſciculus hinc inde iiſdem ambitur, directionem horizontalem versùs lignum ut plurimùm habentibus. In *Ceraſorum* cortice & ſimilium, craſſa quaſi utriculorum faſcia à cuticula per areas fibrarum lignearum horizontaliter versùs lignum recta deducitur. In *quercu*, *alba populo*, & *caſtaneis*, obſervantur multiplicia quædam corpora, teſſerarum inſtar, oblongioris tamen figuræ, cum obtuſis angulis, quorum moles pluribus ſaculorum ordinibus horizontaliter locatis coagmentatur, & dum arctè ligneis fibris hærent, ipſarum areas replent. Corticis exterior ſuperficies ex diverſa foliorum & ſurculorum eruptione variè aſpera redditur, & quaſi ſtriata efficitur; unde in tenellis ramis ordinatæ quædam protuberantiæ per longum internodii productæ emergunt. Singula tamen hæc variis imaginum tabulis erunt exponenda. Ex corticis *ficus cupreſſique* indagine non tantùm exaratæ emergunt partes, ſed peculiare vaſorum genus, *lactiferum* ſcilicet, corticis medium occupans, obſervatur, cujus analogum in reliquis propriis iconibus exponendum erit.

Detracto cortice occurret *Lignea portio*, pluribus & ipſa coagmentata particulis: Potior enim ligni moles fibris ſeu fiſtulis per longum ductis excitatur

citatur, quæ orbiculis ſeu veſiculis invicem hiantibus, ſecundum longitudinem ſtatutis, conſtant, ut in *moro*, *quercu* & ſimil. patet; in quibus variè turgent. Hæ non rectæ, nec parallelæ ducuntur, ſed reticularem plexum efformantes, diverſas, angulares, areas conſtituunt, quarum inſignes occupantur à faſciculis orbiculorum ſeu utriculorum, horizontaliter à cortice per hæc ſpatia versùs medullam productis, ita ut ex frequentibus tranſverſalibus ordinibus, & rectis ſe ſe alternatim ſuperequitantibus, fiat veluti ſtorea. In *quercu*, ultra expoſitos tranſverſales uticulorum ordines, ampliores Ovalium ſacculorum faſciculi eodem ritu producti laxiora retis ſpatia à fibris rectis efformata replent. Fibroſæ ligni portiones, quibus truncus excitatur, veluti circularia involucra ſeſe invicem amplexantur, & continent, & ab utriculorum ordinibus à peripheria versùs centrum horizontaliter productis pervaduntur. Rectarum fiſtularum progreſſum exponere curabo, delineatis, *exteriori* ſcilicet *trunci ſuperficie*, ut reticulare opus emergat, *ſegmento horizontali* ejuſdem, ut ipſarum ora pateant, & *interiori altitudine*, ut ſuperequitationes, in quibus inſunt, deprehendantur. Præmiſsâ inſuper earundem organizatione in *cupreſſu*, *abiete*, *quercu*, & aliis, exponere conabor, ipſas diverſam ſapere naturam à tranſverſalibus faſciculis, quos perſimiles continuatis corticis utriculis, ex diligenti *vitis*, *pyri*, *ulmi*, & ſimilium inſpectione, deducam, cum in utriſque idem color, & ſubſtantiæ modus reperiatur, & ambo medullam versùs non interruptâ ſerie deducantur.

Inter enarratos fibroſos ſeu fiſtuloſos faſciculos locantur *ſpirales fiſtulæ*, numero tamen minores, licèt mole majores, ita ut patenti ore in ſectis caudicibus hient. Variam ſituationem ſortiuntur, ut exhibitis figuris innoteſcet; major verò ipſarum portio diverſis ſub circulis, circa centrum variè locatis, ſeſe invicem continentibus, comprehenditur. Haſce in ſingulis plantis, ipſarumque ligneis partibus, decem ab hinc annis inquiſitas, inveni. Non unam perpetuò externam poſſident configurationem; ut plurimùm tamen oblongâ fiſtularique conſtant formâ, quæ identidem parum anguſtatur, ita ut tot invicem hiantes orbiculos præ ſe ferant: Interdum tamen utriculi diverſis angulis pollentes continuatum canalem efformant; quandoque ovales ſacculi lenes, & lucidi, altero etiam fine impervii, quales in pulmonibus inſectorum obſervare eſt, deprehenduntur, & frequenter plures veſicularum, ſeſe invicem coanguſtantium, ordines eodem ligneo quaſi tubo contenti ſpirales fiſtulas efficiunt.

Componuntur expoſitæ fiſtulæ zonâ tenui, & pellucidâ, velut argentei coloris, laminâ, parum latâ, quæ ſpiraliter locata, & extremis lateribus unita, tubum interiùs & exteriùs aliquantulum aſperum efficit; quin & avulſo zonę capite ſeu extremo trachearum, tum plantarum tum inſectorum, non in tot diſparatos annulos reſolvitur, ut in *perfectorum* trachea accidit; ſed unica zona in longum ſoluta, & extenſa extrahitur. In herbis, & quibuſdam arboribus, hyeme prȩcipuè, pulchrum occurrit ſpectaculum; dum ſenſim divulsâ rami vel caulis adhuc vireſcentis continuitate, tracheę portiones laceratę, & ſolutę remanent. Etenim *motum* hæ quaſi

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periſtalticum per longum tempus interdum ſervant ; ex quo fortaſſe deduci poteſt ratio motus in *mimoſa planta* obſervatus. An hujuſmodi ſpirales fiſtulæ ſint tracheę; pro ſolo aere vel ſaltem halitu devehendo à Natura inſtitutę, examinabo; & an ſimul cum aere ſuccum exportent, & an aerem ab imo telluris, an ab exteriori ambiente hauriant, inquiram.

Quoniam in *ficu*, *cupreſſu*, & evidentiùs in *apio ruſtico*, concreſcente ipſius lacte, ultra fibroſos faſciculos & tracheas, plures obſervantur fiſtularum ordines, lac, butyri inſtar, fundentium, hinc eſt, quod peculiares adeſſe tubulos in ligneo trunco reor, quibus lac, terebinthina, gummi, & ſimilia educuntur, cum etiam in oſſeo amygdalarum cortice circa trachearum faſciculum plures pro reſina cunaliculos repererim.

Inter corticem & lignum media quædam ſubſtantia, *alburna dicta*, locatur. Hęc in *quercu*, *populo* , & aliis evidenter patet, mollioris enim ſubſtantię, dilutioriſque coloris eſt. Tenella eſt ligni ſubſtantia ex corticis addenſatis fibris, & unitis, ut opinor ; ita ut retis areę exiguę fiant : In hac ſpirales fiſtulę ſenſim aperiuntur, & ſolidiori compactiorique redditâ compage , poſt determinatum tempus fit verè *lignum*. Sæpius dubitavi , in Cortice fibroſa involucra, quibus ligni cylindrus quolibet anno augetur, per compendium præexiſtere , velut accidit pluribus papilionum partibus, quę in *Eruca* & *Aurelia* latitant. Alburnę tandem ſoliditatem ex affuſo ſucco per peculiarem ductum delato probabiliter advenire cenſeo. Hujus analogiam mirari licet in animalium oſſibus, quę laminis, ligni inſtar, reticularibus excitantur, & tandem affuſo ſucco indurantur ; quòd mirè in *Dentibus* etiam patebit : Hi enim duplici compaginantur laminâ, quarum exterior reticularis & fibroſa extat, cum cutis ſit exporrecta portio, vel ſaltem ipſius filamentorum ; ſtamina verò à radice versùs dentium baſim producta variè inclinantur, & criſpa fiunt, ut elegans appareat contextura, quę tandem oſſeo affuſo ſucco, adveniente duritie, occultatur.

In interiori caudicis regione *Medulla* conditur, in quibuſdam arboribus, & in ſingulis tenellis ſurculis. Hęc globulorum multiplici ordine per longum locatorum conſtat, qui membranoſi utriculi ſunt, ut evidenter patet in *nuce*, *ſambuco*, & aliis. In caudice *Sambuci*, interiora tenet medulla, & utriculis ſeſe invicem urgentibus compaginatur ; inter hos non longè ab ambiente lignea portione plures fiſtularum ordines peculiarem ſuccum continentium, obſervantur, ſi contentus præcipuè humor concreſcat, vel fuſco inficiatur colore. In tenellis ſurculis medulla non exactè centrum occupat, ſed ut plurimùm ſex angulis conſtans proximior eſt cortici, versùs meridiem, minuitur adaucta ſenſim ligneâ portione. Varias & ſucceſſivas diminutiones, propoſitis diverſis tranſverſalibus ſegmentis *quercûs*, palam faciam ; & quoniam plures extant in ſurculorum ſegmentis utriculorum ordines, à cortice uſque ad medullam horizontaliter continuati, ita ut una & eadem videatur utriculorum natura, ideò quærendum erit, an medulla ſit intercepta corticis ſubſtantia, vel diverſam obtineat naturam, & uſum ; cùm apud pleroſque locum cordis, vel cerebri, vel matri-

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cis teneat. Hinc patebit, quâ ratione ſingulis annis novum additamentum, circuli inſtar lignei, ex fibroſa ſubſtantia & tracheis de novo ſuccreſcat, ita ut ligni diameter augeatur.

Licèt perpetuam Natura non ſervet in compangendis Vegetantibus normam, quædam tamen conveniunt, vel ſaltem analogiſmo parum diſtare videntur; quare in Fruticibus plures trunci, in Herbis ipſis multiplices caules, interdum unus, vel ſaltem vicarius, deprehenditur. In *Vite* igitur, *rubo*, *vite alba*, & ſimilibus, parum abſimilis obſervatur ſtructura; ex luſtrato etenim ſurculi vitis ſegmento, copioſum adeſſe corticem conſtat, huncque ita organizari. Exterior corticis portio utriculorum ſerie donatur, qui ſemicircularis figuræ faſciculos multiplices ligneis fibris excitatos continent. Hujuſmodi utriculorum ordines versùs centrum horizontaliter producuntur, veluti rotarum radii, & ut plurimum quatuor, vel plures etiam, diſparatos lignearum fibrarum faſciculos hinc inde ambiunt, & ſtipant. Expoſitæ ligneæ fibræ per longum ductæ, quadratum corpus referentes, patentibus orificiis hiant. Avulſo cortice, lignea occurrit portio, quæ in multiplices ſolvitur partes: Nam in centro medulla, utriculis diverſarum figurarum conſtans, locatur; ab hac autem, versùs corticem, ligni portiones, in pyramidales partes diviſæ, producuntur, quæ exteriora versùs latiores ſunt, circa medullam verò arctiores: Inter has excurrunt multiplices utriculorum ordines, à cortice ad medullam continuati. Lignea ſubſtantia ſpiralibus fiſtulis ſeu tracheis quam plurimis ditatur, quæ argentea ſpiralique zonâ conflantur: Earum magnitudo inæqualis eſt; ampliores namque quædam ſunt, reliquæ minores. Circa has ludunt ligneæ fibræ reticulariter inoſculatæ; & licèt hucuſque certò non attigerim peculiare vaſculum *lactiferis* analogum, tamen ſubeſſe puto. Ut evidentius tamen hæc pateant, varios icones adjiciam.

Parum diſpar occurrit in *apio ruſtico* partium compages. Cortice admodum craſſo circumambitur, qui orbicularium utriculorum ſerie componitur, ſub quibus lati quidam lignearum fibrarum faſciculi excurrunt. Eadem ſtructura in interiori corticis parte, lignum immediatè ambiente, deprehenditur; intercepta verò corticis craſſities vaſa lac fundentia continet, quæ ſub quadruplici ordine ſituantur, & circa ipſa utriculorum ordines ſtatuuntur, quibus totus corticis ambitus conſtituitur. Hoc avulſo, ſuccedet lignea portio, quæ cylindrum æmulatur, intus tamen cava. Subſtantia hæc in gyrum extenſa exteriùs ligneis fibris per longum ductis conſtat, & ſectus per tranſverſum caulis horizontalem pyramidem exhibet, cujus latior portio non longè à cortice locum tenet, auctior verò versùs centrum dirigitur; pyramidis conus cum oppoſita baſi ligneis fibris conſtituitur, intercepta verò portio ſpiralibus fiſtulis donatur, reliquum ligni utriculorum ordines tenent; inter hos multiplicia lactis vaſa per longum deducuntur, quæ concretum interdum eructant. Singulorum figuras ſubdam; ſicut & *grani turcici*, quod multiplicibns fibrarum faſciculis excitatur, quarum exteriores ligneæ ſunt, interiores verò, faſciculorum centrum occupantes, ſpirales ſunt, reliquum utriculorum ſeriebus conſtat. Eadem

ſtructura in *ferulaceis*, calamo cauleque pollentibus; & reliquis herbaceis exponetur, delineatâ præcipuè implicatione fibrarum, quâ nodus ſeu geniculum excitatur.

Quilibet *caudex*, & ab eo exporrecti rami, productis germinibus, ſtabili deſcribendo ordine erumpentibus, ſui extenſionem propagationemque parant. *Gemmæ* igitur ſunt velut infans cuſtoditus, qui tandem adoleſcit in ramum, à quo, quaſi ab aperto utero, ova producuntur. Menſe itaque *Junii* apud nos *gemmæ* erumpunt, quæ futuro vere aperiri & adoleſcere debent, & folii pedunculus, in eruptione dilatatus, veluti calyx, ipſas tutatur. Herbacea pariter ſuas æſtate gemmas producunt, & ſub terra diu cuſtodiunt: Earum ſtructura talis eſt; cum enim compendium ſit plantulæ nondum explicitæ, trunco conſtat ligneo, brevique, qui mollibus fibris ligneis & tracheis excitatur, à penitiori ligno cum medulla, illuc continuatâ viâ, derivatis: hinc inde, præter implantationem, communicato à caudice cortice ambitur, qui in foliola multiplicia, ſquamarum inſtar, parum ad invicem diſtantia, laciniatur; hæc à contento molli ligno fibras & tracheas ſuſcipiunt, & lanugine, pilis, &c. in *nuce*, & *vite*, &c. cuſtodiuntur; in *populo* verò, & aliis, glutinoſo foventur humore. Hæc omnia ita invicem conglobata conicum ferè efformant corpus. In herbaceis à radicis cylindro, quaſi à trunco, non diſpari ritu, ac in arboribus, erumpit gemma, ſeu oculus conſimili partium apparatu conſtans. In *cæpis* hinc inde à centro gemmę cuſtodiuntur; in *aliis* verò & conſimilibus, gemmarum loco multiplicia cuſtodiuntur quaſi ſemina, quæ ſoboles appellantur, quæ nil aliud ſunt, quàm ſeminalis quædam caro utriculis conſtans, elegantem in medio plantulam, laminis conflatam, cum erumpentibus radicibus cuſtodiens. Exteriorem & interiorem gemmarum faciem in arboribus, & herbis, & præcipuè in quercu, & aliis, exarabo.

Aperiuntur *Gemmæ* ineunte vere, æſtate, aliiſque temporibus, & autumno etiam, præcipuè in arboribus, quibus avulſi ſunt omnes rami; foliola etenim, quibus gemma primò ornatur, parum excreſcunt, elongato tenello ſurculo; & in pluribus arboribus à lignea germinis parte, quæ intercipitur à foliorum radice, erumpere incipit folium ſtabile, quod ſenſim auctum explicatur, & poſtremò propriâ donatur figurâ; interim tamen prima gemmæ foliola proprium ſervantia ſitum, ſtabilis folii radicibus hærent, & brevi exſiccata decidunt. Hoc in *quercu* delineato progreſſu patebit; in aliis verò, ut in *prunis*, germinum foliola parum elongata versùs mucronem inciſuras patiuntur, ipſe verò excreſcit, & producto petiolo in ſtabile folium extenditur, dum laciniatæ particulæ in caduca foliola exſurgunt; in aliis, licet idem habeatur progreſſus, prima gemmæ foliola perpetuò folii petiolo adſtant. In *acere*, *vite alba* & ſimil. foliola prima mitratam habentia figuram in mucrone inciſa, appendices germinant, quæ in folia extenduntur, reliquum verò parum gracileſcens in folii petiolum abſumitur. In *rubo canino* idem mirari licet augmentum; binæ tamen portiones antiqui folii producto petiolo hinc inde adſtant, & brevi collabuntur. In *nuce* pariter convolutas complicataſque habent in extremitate

appen-

appendices, quæ in germinatione ſtabile folium conſtituunt, attenuata verò in pediculum ſtabilis folii faceſſunt. Singula *tabulis* exponam. Tenellus ſurculus & folia fungis & papillis ornantur, à quarum perforato & concavo capitulo *terebinthina* funditur; ſpinæ quoque, & lanugo à foliis pendent, varioſque colores exhibent.

Ab elongato igitur tenello ſurculo pendent *Folia*, non inſertione ſeu articulatione mediâ, vel radicatione, ut aliis placet, ſed continuatis ſurculi partibus ad extra derivatis. In *vite* evidentiùs hoc patet; ex altero enim nodi latere octo diſparati faſciculi ſub ſemicirculo ſituati, à lignea portione erumpunt, & ſenſim recollecti in inſignem faſciculum, folii pediculum conſtituunt; ſinguli verò faſciculi ligneis conſtant fibris, ſpirales fiſtulas ambientibus; & unà cum ipſis producuntur fibræ pariter à cortice deductæ: Reliquum verò ambitus, corticis utriculis conſtituitur, qui cum exteriori cortice communionem habent. Conſimilem ſtructuram mirari licet in *fæniculo*, *braſſica*, & ſimil. Variam circumſcriptionem in diverſis plantis ſortiuntur folia; peculiares tamen formas, præcipuè *cupreſſûs*, icone illuſtrabo. Hæc in ſingulis plantis extensâ pollent corticis ſubſtantiâ, quæ ligneis fibris & tracheis irrigatur. Enaſcuntur in quibuſdam arboribus in nodo hinc inde, in reliquis verò alternatim unicum promitur folium, vel aliâ, exponendâ, methodo; corticis etenim portio, in cylindrum coarctata, derivatam lignearum fibrarum portionem, cujus medium tracheæ occupant, folii pediculum in pluribus arboribus efficit, qui deinde dilatatur, & hinc inde à faſciculo, ſeu coſtula, per longum folii excurrente, diviſis & productis fibris, & tracheis, fit rete ex mutua anaſtomoſi, ut in ſanguineis vaſis accidit; ſpatia verò appenſis utriculis replentur, qui variâ pollent figurâ in diverſis foliis, & tandem ambiente cuticulâ, valde tenui, hæc placentula cuſtoditur, à qua minimæ ſpinæ lanugo, ſeu pili, fungi, & conſimilia delineanda erumpunt. Foliorum extremitas faſciculo fibroſo ambitur, qui in apice denticulatæ foliorum partis parum protuberans, papillarem appendicem efformat, quæ in tenellis terebinthinam fundit; æſtate verò ſicceſſit. In quibuſdam oleo refertæ veſiculæ obſervantur. Inter expoſitas folii fiſtulas lactiferum vaſculum locatur, quod in *moro*, *ficu*, &c. patet, & in reliquis quid analogum aderit. Decidunt folia ferè à ſingulis arboribus & herbaceis, noſtris hiſce regionibus, autumno præcipuè, corrupta *ſcil.* pediculi portione prope eruptionem. Hunc autem prolapſum præcedunt utriculorum, quibus folii latitudo conſtituitur, extenuatio, coloris item mutatio, humoris pariter in fiſtulis ſtagnantis corruptio, ex ambientis fortè energia, vel ſaltem volatilium particularum inopiâ; & ita fibrarum & trachearum tollitur continuitas. Stirpium & ſimilium folia, variè configurata, dictorum veritatem magis aperient, exhibitis ſtructuris foliorum *opuntiæ*, *arundinis*, &c.

Ramorum productionem à Natura inſtitui pro ovorum generatione, probabile; quare florem, quaſi uterum cum ovo, ſeu tenello fœtu, ſtato tempore aeri exponit, ut tandem, emancipati filii inſtar, in novam ſobolem excreſcat. *Flores* igitur non longe à gemmarum ſitu eminent prope folii

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pediolum; evidenti productione patent æstate, gemmarumque more conduntur, & transactâ ut plurimùm hyeme aperiuntur. Anticipata ipsorum productio in *moro*, *cæpis*, &c. delineabitur; curiosorum, variis additis configurationibus, compositionem describere tentabo : Etenim in quibusdam simplicioribus primò surculi substantia, ubi semen conditur, in ovale corpus extenditur, cujus tamen caro, seu pericarpium, in prima productione non patet, sed sensim augetur : Ab hujus extremo erumpunt à laciniato cortice calycis folia; ab eodem pariter segmento floris folia emergunt, quæ utriculis, seu globulis ordine positis fibrarum lignearum & spiralium productione constant. Circa folia hærent cæcæ appendices, fungi, pili, & similia, glutinosum humorem fundentia. Eundem exortum stamina sortiuntur, quæ frequenter capitulo seu apice, farinaceam substantiam continente, pollent. In aliis foliorum & staminum exortus infra ovale corpus, semen condens, observatur, ita ut flos seminis capsulam tegat, ut in *vite* & simil : Sensim contabescunt folia, & stamina, & postremò decidunt. Consimilium florum structuram exponam, delineatis præcipuè *heliotropii*, *cardui*, *cucurbitæ*, & sylvestrium plantarum quibusdam floribus.

Subjectum seu contentum *semen* diversis capsulis seu involucris fovetur, quæ *uteri* munus explent. In pluribus in fructum esui aptum excrescit, cujus partes exarabo, & primò pericarpii structuram, exordio sumpto à *ficu*, qui exteriùs cortice tectus reticulares fibrarum plexus unà cum contentis tracheis continet; à quibus oblongæ stiriæ, quibus pericarpii moles excitatur, versùs centrum deducuntur, quæ hinc inde utriculis succo turgidis stipatæ tandem eleganti extremitate semen osseo cortice circumdatum custodiunt. *Cerasorum*, *uvarúmque* caro reticulares pariter fibrosos plexus, à quibus pendent utriculi, possidet. *Pyrorum & cydoniorum malorum* pericarpium fibroso reti coagmentatur, quod tartareis quibusdam globulis, seu nodis, firmatur, areæ verò pendentibus utriculis perbellè replentur. In *granatorum* fructu circa semen, radiorum instar, graciles utriculi succo turgidi situantur. Elegans est *mali aurantii & limonii* pericarpium, cujus exterior caro concavitates efformat, quæ utriculis, velut intestinulis cæcis, acido succo refertis, repletur, quibus contenta semina stipantur. His lucem feret omnium elegantissima evidensque *cucurbitæ* caro, quæ fibrarum lignearum fasciculis, tracheas continentibus, constat, à quibus pendent utriculi; illi verò à pediolo fructus emanantes, mox interiùs circulares redditi, extremo tandem fine, à quo semen pendet, in mediam hiant cavitatem, velut in corde, carneis lacertis & fibris valvulas firmantibus, accidit; & ita tota pericarpii moles excitatur, & in hos solvitur. In *fragaria* oppositus servatur situs, pericarpium enim interiora tenet, & semina exterius exhibet. In *nuce*, *amygdalis*, & similibus, pericarpii parum excrescit, quod adaucto semine contabescit, relicto osseo putamine, quod in *amygdalis* elegans est. In *avellanis*, *cupressu*, & *pino* ligneus fit cortex, vicesque pericarpii supplet. In *glandibus* & *castaneis* membraneum extenditur involucrum; *illæ* ligneo calyce donantur; *istis* verò spinosum additur involucrum echini instar, &

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interiùs villoſi utriculi ſemen cuſtodiunt. In pluribus *leguminibus* & *herbaceis* loco pericarpii ſiliqua extenditur, quæ fibroſo plexu conſtans, productis præcipuè in faba villoſis utriculis ſucco refertis, contentum ſemen fovet. In aliis Semina loculis includuntur, qui interdum craſſi ſunt ex utriculorum multiplici ſerie, interdum graciles. *Frumentum*, *avena*, & ſimilia, ſpicis, hoc eſt, exiguis loculis hiantibus, & ſeſe amplexantibus, cuſtodiuntur, & aculeis frequenter muniuntur. In pluribus oſſeus additur cortex, & quandoque folio uno plura ſemina celantur. Quandoque Semina à ſubjecto amploque quaſi pericarpio aſſurgentia, ut in *cinarâ* patet, floſculis muniuntur. Nonnunquam lanugine, pappis, vel pilosâ appendice ſemina ipſa ſtipantur, & ornantur. Denique tam ferax eſt Natura in parandis tegumentorum ſtructuris, ut ſingulas recenſere ſit impoſſibile. Communiores igitur exponam, delineando pericarpium *cucurbitæ*, *pomorum*, & ſimilium, ſiliquas diverſas, veſicas, loculos, ſpicáſque varias.

Nec ſat fuit Naturæ exaratos Uteros ſeminibus parare, ſed alia inſuper addidit, quæ cuſtodirent, & germinationi inſervirent. Hæc autem in avulſo à receptaculo Semine obſervantur; bina etenim involucra ferè ſemper occurrunt, quorum exterius firmius eſt, & quaſi cartilagineum, omniumque vaſorum genere donatur cum interpoſitis utriculis, ſubjectum verò mollius eſt & ſpongioſum. In *amygdala* exteriùs protuberant ſacculi, ſeu inteſtinula, cæcorum inſtar, à fibroſo reti pendentia. In Fabis & ſimilibus leguminum ſeminibus, hiantia quaſi ſiphonum ora totam peripheriam exterioris involucri occupant; illi verò interiora versùs horizontaliter producti in utriculorum diverſos ordines aperiuntur, qui Semini communicant. In aliis parum obliquantur hujuſmodi ſiphones, quorum elegantes figuras in *cucurbitæ*, *fabæ*, *tritici*, &c. ſeminibus delineare curabo. Aliam inſuper viam Natura aperuit ſubingredienti humori; in pluribus namque Leguminibus ovalis feneſtra paratur, oblongâ aperta ſciſſurâ, quâ in globoſum ſpongioſumque corpus plantulæ, extremo trunco proximum, humor admittitur. Horum icones deſumam à *lupinis*, *ciceribus*, *faſeolis*, & *orobo*; In pluribus autem, in quibus evidens non occurrit feneſtra, hiatus aperitur, laxato exteriori cortice, unde plantulæ conus exteriùs communicat; ut in *pyris*, *pomis*, & ſimil. mirari licet.

Tantus partium apparatus in gratiam conditi *ſeminis* à Natura fabrefactus eſt. Hoc autem eſt *fœtus*, vera ſcil. planta, ſuis integrè conformata partibus, foliis videlicet, ut plurimùm binis, caudice ſeu caule & gemmâ. Hoc manifeſtatur reſolutione facta amygdalarum, nucum, pomorum, &c. In his etenim caro ſeminis foliorum naturam verè ſapit, & globulis ſeu utriculis, in caulem ſeu caudicem inclinatis tracheis, inſuper conſtat, & germinante ſemine in quamplurimis vireſcit. Plantulæ hæc folia caudici appenduntur, à quo germen ſeu ſurculus aſſurgit. Simplicior & evidentior plantulæ ſeminalis ſpecies in arboribus, & quibuſdam plantis emergit, ut in *pomo-granato*, *melilotto*, *veſicaria*, *atriplice*, *colutea*, & ſimilibus, in quibus interdum evidenter explicita ſunt ſeminalis plantulæ folia, interdum convoluta & contorta. Evidentiſſimè hæc patebunt delineata à primordiis

ſucceſſivâ plurium ſeminum productione: Nam primò in colliquamento minima plantula expanſis binis foliis, velut alis, trunco exili appenſis, emergit; foliola verò ſenſim aucta, & craſſiora reddita ita contorquentur, & complicantur, urgentibus parietibus continentis receptaculi, vel corticis, ut alienam induant ſpeciem. Hæc *nucum*, *caſtanearum*, *cucurbitæ*, & diverſorum leguminum figuris patebunt. Familiare eſt ipſi Naturæ, fœtum hunc in colliquamento morantem placentâ interdum unâ, quandoque alterâ, foliorum hiatum replente, donare; ut in *cucurbita*, *avellana*, *amygdala*, *pomo*, & *leguminibus*, quorum ſucceſſivam productionem delineabo: Simulque exponam, ſeminalem hanc plantulam, non ſolum à placenta, ſed à colliquamento immediatè, nutritionis & auctionis materiam per foliorum peripheriam recipere; quod de *Animalium* etiam fœtibus in humore innatantibus dubitari poteſt. At, cùm non adamuſſim *eandem* ſervet Natura regulam in configurandis ſeminalibus plantulis, varias addam figuras, *avenæ*, & *tritici* præcipuè, cujus plantula placentulam habet, radicem ejus foventem; hæc gravi carni hæret, quæ loco folii convoluti extat: In aliis verò ſeminibus, præcipuè bulboſis, plantula, cæparum more, involucris componitur pluribus, quæ foliorum vices fortè ſupplent; ſeminis verò conglobata caro, placentæ vicaria, hinc inde locatur, ut patet in *Matthioli hyacintho*, *lilio*, & *aſparago*.

Exaratæ Seminales plantæ, quaſi gemmæ, ſuo involucro cuſtoditæ, à ſurculis medio fibroſo faſciculo, tracheam ambiente, elongari, & ab ipſis decidere videntur; quare extremitas trunci ſeminalis plantulæ versùs inſertionem lignei faſciculi frequenter dirigitur, & ab ipſo parum diſtans ſeparari videtur eo in loco, qui *Umbilicus* dicitur, ob hanc fortè rationem; quam conjecturam àliis firmare conabor. In confirmationem dictorum, diarium germinationis ſeminum, quarundam plantarum iconibus diſtinctum, addam.

Præter Semina, alia inſuper obſervantur, ab arboribus & quibuſdam plantis pendentia, ut *amentum*, *gallæ*, *ſpongiolæ*, & villoſi *tuberculi*, quorum peculiarem inſtituam ſermonem. Admodum enim incertum hactenus evulgata me reddunt, quibus Animalia ab arboribus & herbis in gallis, veluti uteris, gigni docemur; cùm mihi obſervatorum ſeries, quam infra recenſebo, conjectandi anſam præbeat, gallas & ſimilia nidum eſſe ejecti illuc ovi, vel vermiculi à parente *animali*, nequaquam verò à *planta*. Evidens namque eſt ex Aranearum folliculo, ova continente, concavum reddi ſubjectum folium *quercûs*: In *vite* verò, *quercu*, & ſimilibus, ex ejecto vitellino Muſcarum ovo ita circa ipſum contorquetur folium in ſpiram, ut totum in globulum deſinat. In aliis reflectitur denticulati folii extremitas; & parum craſſeſcens, ovum ibi cubatum fovet. In tenellis quibuſdam plantis, ut in *orobo*, ex recepto ovo ita curvantur folia, ut unitis extremis, fiſtularis cavitas pro nido ſuccedat. *Quercûs* pariter folia receptis ſeminibus inter membranas jam adoleſcentem aureliam fovent, & nutriunt: In aliis verò ex affluente magis & magis ſucco, tumores pro nido & fotu excitantur: Etenim in quibuſdam foliis quercûs excreſcentiæ quædam, ſeu exiguæ pla-

placentulæ, pilis ornatæ, ſuboriuntur, brevi pedunculo firmatæ, quæ in ſui centro Muſcarum ovum continent, & aurelias pariter ſub ſe cubantes defendunt, & tegunt. In diverſarum plantarum foliis, ut in *populo*, *ſalice*, & *vite*, inæquales aſſurgunt tumores, hique inſignes ex quacunque folii parte, quorum cavitate ova jam edita cuſtodiuntur. In *ulmo*, & *populo* tota folii vireſcentis ſubſtantia in cavernoſam deſinit concavitatem, quâ innumeræ aureliæ, & tandem muſcæ continentur. Elegantior etiam nidus erumpente quercinâ uvâ paratur, quæ à ſucco in foliorum utriculis contento gignitur; quod *ſalici*, *rubo canino*, & *populo* familiare eſt. Mirabilior tamen eſt in *hedera* terreſtri uvæ ſtructura, quâ ſtabilis animali nidus paratur.

Nec ſola foliorum moles animalibus nidum præbet, ſed & lignea ejuſdem pediculi portio, in *populo* præcipuè contorti, & aucti, concavitatem muſcis efformat. Tenellus pariter ſurculus in *quercu* concavus redditus, nidum & pabulum condito animali exhibet, & *rubi* exiguus ſurculus, coacervato ſeu potius impedito nutriticii ſucci effluvio, in ovalem tumorem, dum excreſcit, incluſum ſervat ovum, & recepti primò ovi cicatricem perpetuò ſervat. Frequentiùs verò ova in germinibus conduntur; quare in quercu interdum parum expanſa & adaucta germinis foliola in ſui medio aureliam ligneo nido incluſam ſtipant: In aliis non adauctis gemmæ foliolis futuri ſurculi alimonia circa ovum, vel plura etiam, affunditur, & utriculorum ordines ſurculum compoſituri immutatâ viâ circa ovum contorquentur, & fit *galla*, quæ quaſi coronata interdum efficitur, & nonnunquam appendices corniculatas promit. Tandem in *rubo canino*, *quercu*, & ſimilibus, ex germinum affluente ſucco fit folliculus, cum ramorum & filiorum inchoamentis. Et poſtremò non ſolis foliis, ſurculis, & germinibus datum eſt ova fovere, ſed & fructuum corticibus & pericarpiis; unde inſignes quaſdam miratus ſum excreſcentias, foliorum formas ruditer æmulantes, à cortice glandis pendentes, quibus ovum cuſtodiebatur.

His adnectam, plantarum partes exteriùs ulceratas, excreſcentias parere gallis analogas; & in unico *rubi canini* folio uvam, diverſas gallas, placentulam, & villoſos tuberculos aſſurgentes me obſervaſſe. Horum & ſimilium obſervationes mutuam ſibi lucem ferre oſtendam; priores enim non ſolum folliculos & ſimilia, in animalis & editi ovi cuſtodiam & alimoniam excitata evidenter demonſtrant; ſed & poſteriores illuſtrant, ſimulque nobis dubitandi locum aperire videntur, ova in hujuſmodi tenellis plantarum partibus à parentibus *muſcis* condi; &, quoniam acri ſucco madida ſunt, & perpetuo conſimilem tranſpirant, ideò plantarum fiſtulas lacerando contorquere, novumque motum appulſo ſucco communicare; ex quo variæ *gallarum* ſpecies, in quibus tamen germinationis naturæ vis, licet obſcura, latitat, cùm foliorum ſurculorumque inchoamenta & rudes ſpecies emergant.

Ramos quarundam plantarum Spinis & aculeis Natura armavit, quarum exortum, figuram, & naturam exponam. Capreolos pariter, & ungues delineare enitar. *Fungorum* etiam fibroſam compagem unà cum *mucedinis* plantæ iconibus deſcribere conabor.

Plantas

Plantas reliquaque vegetantia consimilia, Naturam *radicibus*, quibus alimonia trahitur, & illa firmantur, donasse, omnibus patet. Sunt autem *radices* in arboribus portio caudicis, qui divisus in ramulos, tandem in capillamenta, solvitur; ita ut arbores nil aliud sint, quam fistulæ exiguæ dispatatæ, & per solum productæ, quæ sensim in fasciculos colliguntur, qui & ipsi ulteriùs aliis insignioribus uniti, tandem omnes sub uno, ut plurimùm, cylindro collecti, truncum efformant, qui oppositâ extremitate, factâ iterum fistularum separatione, brachia promit, & sensim subdivisis manipulis ex majoribus in minores, ultimo in folia extensione factâ, postremum sortitur terminum. Extremæ igitur radices in arboribus unâ vel alterâ tracheâ constant, circa quam ludunt fistulosi lignei plexus reticulariter ita producti, ut interceptæ areæ anguli acutiores sint; prout autem radix augetur, unitis aliis radiculis, ligneæ fibræ lucidæ, pilorum instar, trachearum intercapedines replent; cortice valde crasso mollique circumambiuntur; & in quibusdam, radicularum extremitas appendice quasi placentulâ donari solet; ipsarum verò ambitus capillamentis mollibus, lanuginis instar, stipantur. Cortex, de more, utriculis horizontaliter locatis conflatur, fibris pariter ligneis & peculiari *lactifero*; quod in *moro* & aliis evidens est. In amplioribus radicibus Spirales fistulæ productæ inclinationem versùs centrum servare incipiunt; crassior pariter redditus cortex de more ambit, & tandem radicis truncus excitatur, in quo manifestiora sunt omnia exarata. Minorum radicum tracheæ non sunt omnes parallelæ, nec rectæ, sed variè obliquantur, varicosæque redduntur, & molliores radiculæ ita circa glebæ frustula contorquentur, ut quasi manibus ipsa apprehendant. Singula delineabo, indicatâ intimâ minorum radicum ab insigni radicis cylindro eruptione.

Reliquarum Plantarum non dispar structura manifestabitur, expositis primò *leguminum* præcipuè radicibus, utpote simplicioribus, quæ cortice satis crasso constant, mollibus fistulis ligneis, & tracheis sub cylindri specie productis, quo radicis medulla constituitur, quæ versùs superiora tubulosa redditur; in aliquibus autem radicibus lignea portio non conglobatur in solidum ubique corpus, sed per longum concavitatem habet, quâ carneam medullam custodit. In aliis herbaceis, ut in *plantagine*, fistularum fasciculi folia percurrentes, dum radices subeunt, amissa rectitudine invicem decussantur, & spatia utriculis succo turgidis replentur, & fit *caro*, ut vulgo appellatur; iterum tamen separati, in radices & radiculas desinunt. In *asparago* superior radicis portio, seu nodus, ligneis fibris reticulariter implicitis constat, à quibus utriculi pendent. Ab eodem nodo elongantur radices, quasi ovalem habentes figuram, à quibus radiculæ & lanugo erumpit. Interiorem ipsarum partem ligneus tenet cylindrus gracilis, qui tracheis in orbem situatis constat, & ligneis fibris; reliquum verò, crassius, corticis utriculis per longum locatis completur. Implicatam *arundinis* radicem retexere tentabo, delineatâ fasciculorum fibrosorum germinatione, & mutuâ superequitatione, dum in surculos & oculos absumuntur. *Cæparum* pariter compagem proponam; hæ pluribus tunicis, seu

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involucris, conglobantur, quæ faſciculis ligneis reticulariter unitis & tracheam ambientibus ditantur, à quibus utriculorum multiplices ordines pendentes, ipſarum ambitum conſtituunt; elongati verò inferiùs fibroſi faſciculi, dum parum implicantur, radicis centrum efficiunt; ulteriùs tamen producti unà cum ambientibus ſacculis, radices & capillamenta conſtituunt. Reliquorum quoque *bulbaceorum* quaſdam proponam configurationes, præcipuè *raparum*, *raphani*, *brioniæ*, & aliarum plantarum. His addam icones tuberum & quorundam foliorum, quæ humi hærentia à coſtulis radiculas promunt.

Coronidis loco addendum eſſet aliquid de *plantarum Oeconomia*, ipſarumque *partium Uſu*, & *alimenti* præcipuè *Via*. At quoniam multæ aleæ plenum opus eſt, ob æquivocas & ferè impoſſibiles obſervationes, ideò quædam tantum proponam, ut accuratiores & exercitatiores meliora promant. Primò igitur certum eſſe ex dictis inducam, plura eſſe in plantis vaſa, ſeu fiſtulas. In *Cortice* enim copioſas eſſe fibras, vaſorum in modum perforatas, ex dictis patet. *Lignum* pariter fibris coagmentari, quarum alias ſpirali Zonâ componi diximus, alias verò quaſi hiantibus orbiculis conflari retulimus: Et poſtremò ſpeciale *Vas*, quo lac vel reſina funditur.

Dubium tamen illicò occurret, an ejuſdem naturæ, & in eundem finem fabrefactæ ſint fibræ *corticis*, & *ligni*. Herbarum verò & ferulaceorum indago *eaſdem* eſſe probabiliter indicabit, cùm & corticis fibræ, duriores redditæ, in lignum vertantur. Certum erit, *utraque* vaſa humorem fundere; quod ex ipſius eruptione patet. Certum pariter oſtendam, in plantis plurimum *aeris* contineri, eo quòd ſectæ ſub aqua multum aeris reddant, & in ipſis fiſtulæ, perſimiles pulmonibus inſectorum, inſint. Dubium erit, an ab imis & extremis radicibus aer hauriatur, an verò à ſuperioribus finibus, externo cum aere commercium habentibus? Quoniam tamen ſpirales fiſtulæ, ſeu tracheæ, radices copiosè componunt, & aër faciliùs ſurſum pellitur, ſuumque exerit opus & energiam, ideò aerem & halitus ab imo terræ deduci probabilibus indicabo.

Evidenter etiam obſervari ſuccum, modò lactis ſub ſpecie, modò gummi, modò terebinthinæ, cum proprio vaſculo oſtendam; inde conjectans, in ſingulis vegetantibus peculiarem adeſſe ſuccum proprio vaſe delatum.

Circa *motum* autem exaratorum humorum, ipſorumque terminos, illud certum eſſe referam, in pluribus inverti; cum ſurculus in *ficu*, *prunis*, *rubo*, &c, ſi ſub terra condatur, graciliore extremitate radices promat, & in arborem, minùs tamen proceram, excreſcat; unde alimenti via invertitur.

Evidentem pariter eſſe proponam inter alimenti vaſcula mutuam *anaſtomoſin*, ita ut obliquatus etiam reddatur ſucci tranſitus, nec per eundem tubulum rectum perpetuò feratur. Hoc patet in laceratis coſtulis quibuſdam foliorum *cucurbitæ*, *limonum*, &c. in quibus ulterior, è directo detruncatarum fiſtularum locata, ſubſtantia augetur, & vivit, communicato à lateralibus fiſtulis alimento. Hanc poſitionem illuſtrat reticularis plexus vaſorum in foliis, bulbis, cortice, & lignea portione.

Conſtabit pariter per ligneas fiſtulas, & corticales, humorem versùs

ramos & folia aſcendere. Humoris tamen aſcenſum ſingulis fiſtulis nequaquam communem eſſe patebit, conſiderato uſu & actione foliorum cucurbitæ, à ſeminis carne productorum, quæ pulpoſa aliquibus dicuntur: Nam certum eſt, (ut ex diario germinationis leguminum patebit,) bina folia ab extenſa ſeminis carne, comproductâ in cucurbita & aliis, à radice humorem recipere, cùm in ingentem excreſcant molem; ſed iterum in caulem progerminatione & auctione evidenter remittere. Nam avulſis à germinante planta, eadem ſicceſſit; & in leguminibus ſeminalis caro, quæ folium eſt conglobatum, licèt non extendatur & vireſcat, recepto tamen humido oleoſam ſubſtantiam, propriumque ſuccum plantulæ, cujus cauli continuatur, affundit, ita ut *placentæ* vices ſuppleat. Conſimilia accidere in excreſcente germine, ex dictis patet, cùm ut plurimùm prima foliola placentæ vices gerant, & novis ſubortis foliis decidant.

Hinc probabiliter deducam, folia à Natura in hunc uſum inſtitui, ut in ipſorum utriculis nutritivus ſuccus contentus, à ligneis fibris delatus excoquatur; frequenti enim anaſtomoſi vaſorum in longo itinere commixtus humor, ſolarium etiam radiorum vi attritus, dum antiquæ, in utriculis adhuc perennanti, materiæ miſcetur, novam ſubit partium compagem, & tranſpiratum, non diſpari ritu, ac accidit novo animalium alimento, quod reliquo ſanguini in vaſis à nutritione relicto affuſum, ab eodem in ſanguinis naturam exaltatur. Conſimilem naturam reperiri in Corticis utriculis, atque etiam ſeriebus, tranſverſam ligni partem occupantibus, probabiliter evincam; ut inde pateat, non irrationale eſſe, in iiſdem loculis plantæ alimoniam concoqui, & ſervari. Pericarpii humor, in corticalibus utriculis coadunatus, & excoctus; *cæparum* pariter ſacculi, copioſum humorem aſſervantes, & in novi germinis augmentum erogantes, multum lucis jam exaratis afferent; ſicut & adaucti utriculi in detruncato *quercu*, & aliis, qui ita aſſervato humore turgent; qui aliàs in trunci & ramorum alimoniam conſumi conſueverant, ut fibrarum lignearum areæ inſigniter dilatentur, & ipſæ fiſtulæ contorqueantur.

Conjecturalis tamen erit excocti alimenti ſemita, à foliorum utriculis, cortice & medulla effluentis, & quodammodo regredientis. Licèt enim probabile ſit, inferiora versùs elabi in truncum & radices; non videntur tamen extremæ ramorum partes, ultra folia locatæ, quibus uteri appenduntur & conſimilia, ſpoliandæ hoc beneficio; unde probabilius oſtendam, ab utriculis derivari excoctam jam alimoniam mediis vaſculis reticularibus, quorum adumbrationes in *typha* obſervantur, abſque perenni & conſiderabili fluxu & refluxu, eamque in vaſculis lactiferis, ſeu ſanguineis, quaſi ſtagnare, & juxta indigentiam, (quam tranſpiratio, & exteriorum actio diverſimodè promovent,) effluere interdum etiam ad contiguas parumque ſuperiores partes; & ita ſubſequi augmentum & nutritionem, cum plures etiam arborum rami, & herbacea, horizontaliter ſituentur. Alias ſimplicior arriſerat via; diu enim credidi, alimoniæ materiam per ligneas fibras à radicibus deferri in univerſam arboris molem, ab utriculis verò tranſverſaliter locatis fermentativum immiſceri ſuccum,

qualis

qualis à glandulis, chylo & ſanguini pertranſeunti affunditur : Ulterior tamen meditatio exaratam ſuperiùs viam probabiliorem indicavit.

Hiſce delineatis, probabiles *aeris* uſus in plantis eliciam, conſideratis inſectorum tracheis, aerem ad quamcunque corporis partem deferentibus ; Cùm tamen valdè probabile ſit, ultra vitæ communicationem, beneficio aeris plantas ſurſum erigi in germinatione, tales conſervari in augmento, & vitæ proceſſu, ſuccorum pariter aſcenſum & fermentationem facilitari, & alia conſimilia.

Hæc igitur, quæ Mens, ægro corpore, in ſui ſolatium meditatur, tumultuariè Vobis exhibeo, quæ ſi non undequaque inutilia, & à recta Philoſophandi ſemita non multum devia, veſtrâ prudentiâ judice cenſebuntur, repetitis iterum atque iterum obſervationibus, fuſius exponam, veſtriſque, licèt impar, mentibus munuſculum parabo.

Dabam BONONIÆ

Calendis Novemb. 1671.

MAR-

MARCELLI MALPIGHII
ANATOME
PLANTARUM.

MAGNÆ SOCIETATI REGIÆ ANGLICANÆ

Marcellus Malpighius S. P.

PRiſci olim Ætruſci, *quibus gens noſtra originem debet, animalium victimas mactare conſueverant, ut luſtratis viſceribus, belli & pacis ancipites eventus certò enunciarent. Exanguium ego Vegetantium repetitâ ſæpius ſectione, eorundem exta, prout licuit, ſcrutatus ſum. Quod ſi Aruſpices integrâ exiſtente victimâ holocauſtum Diis parabant, diſſecta hæc innocentis generis viſcera Vobis, Doctiſſimi Sodales, offerre humiliter liceat: Ex horum enim inſpectione, Naturalis Scientiæ, pro cujus adaugendo regno ſeduli militatis, auctam intueor ditionem. Jam* Aeris & Aquæ *ſubacta regna; profundas quoq;* Terræ & Maris *luſtratas oras veſtris expeditionibus agnoſcit Orbis: Nec* Animalium, *quibus terra premitur, abditis particulis parcitur, nec* Aſtra *ipſa* Cœlumque *intacta relinquuntur. Quare, cùm tam vaſtum imperium Veſtris artibus ſubigi cæperit, debitos Ego quoque tam celebri triumpho applauſus collaturus, adumbratam Vegetantis Orbis imaginem humillimè exhibeo; mihique ſat erit, Promontoria & ſinus indicaſſe, ut novis expeditionibus tam vaſtum Herbarum Arborumque regnum diſtinctiùs cognitum, ſub veſtra cadat ditione.* Valete.

PRÆFATIO.

TElluris, Magnæ Matris, emancipatos quasi filios Anatomicæ laniena humana Sciendi prurigo hactenus damnavit: Animalium enim universum genus, quod relicto materno terræ sinu liberum, aquam, vel aerem, vel ipsius varias oras pervadit, in hominum sapientiæ libidinem jugulatur; reliquum illud supereſt natorum genus, quod nativo ejusdem gremio perpetuò hærens, leniter assurgit: Hoc autem sub variis Plantarum speciebus intuemur, quæ commixtam telluri ita sortiuntur vitam, ut illius connati filii censendæ veniant; ni satiùs dicamus, terram ipsam abdomen ingens esse, in cujus officinis alimentorum digestiones, excrementorum præcipitationes fiant; huic autem necti & inseri, thoracis loco, & subcrescentis capitis, varias & multiplices Plantarum contexturas, quæ novum sui generis cerebrum constituant. Erumpentium hujusmodi plantarum acervus tam ferax est, ut non facilè in distinctos redigi possit ordines; antiqua enim distinctio, in arborem sc. fruticem, subfruticem, & herbam, suas quoque invenit difficultates apud Botanicos; unde quidam solis arborum & herbarum generibus contenti, fruticum & subfruticum capita neglexêre. Nec defuerunt, qui attentâ variâ seminum & foliorum formâ, reliquisque phœnomenis, prima vegetantium genera adeò multiplicaverint, ut eadem planta sub diversis speciebus decies describatur; unde sanioribus passim impossibile videtur, plantas omnes in determinatos ordines distinguere. Neglecta igitur generum designatione, licebit universam vegetantium familiam velut unicum vivens rimari: In plærisque enim truncus, folia, & radices occurrunt solâ duritie vel mollitie varia, ita ut quamplurimæ herbæ, tenellæ & humiles quasi arbores dici possint. Hoc itaque viventis organicum corpus anatomicè examinandum assumpsimus, non dispari methodo, ac in animalibus passim peragitur, indagando sc. viscera, multiplicia vasorum genera, medullam & semen; institutâ prius earum exercitatione plantarum, in quibus minus obscurè emergunt partes, & subinde productâ in reliquas, ubi obscuriori quasi velo Natura sua condidit arcana. Hanc Plantarum anatomen pluribus fortasse, quam natura rei exigit, exposui; varii namque irrepsere in exarandis Naturæ operibus rudes mentis meæ conceptus, & innumeræ, quibus forsitan incongruè interpretatus sum Naturæ mysteria, copiosam scripturitionem fecere. Paucis, & his quidem minimis, contenta est Natura, etiam dum ingentes operosa excitat moles; quare qui rem altiùs rimantur, in hæc abunde resolvunt. Opportunius igitur, te judice, amice Lector, fortasse fuisset, postquam rerum atomæ differentias non licuit attingere, copiosam saltem operandi Naturæ segetem, singulaque phœnomena, quibus Vegetantium varietas mirabiliter universam tellurem exornat, per extensum exponere, ut tu maturiori judicio in pauca & minima satiùs resolveres: At judicii mei languore, ingeniique hebetudine, media inter utrumque via progredi coactus sum, unde nec omninò in meditationibus jejunus, nec in tentaminibus profusus extiti: Qualiacunque tamen sint, ne dedigneris; utpote congesta à viro, qui Botanicis non assuevit studiis, alieno distractus negotio, cui gravior

medendi

medendi cura otia deturbavit, & qui tandem nulla amanuensium ministrorumve concurrente operâ, solus studia hæc absque amicorum ope congessit, non ut tibi latum doctrinæ campum aperiret, sed ut valetudinariæ vitæ tædia contemplationis hujus lenocinio demulceret. Scio insuper, me in tam minimorum indagine rudia usurpasse instrumenta, & iconum delineamenta incomptiùs exarasse. Si perfectiora acutioraq; vitra ad manus fuissent, & in delineando majori peritiâ valuissem, jucundius & distinctius opus minori cum labore tibi parassem.

DE

DE
CORTICE.

Lantarum organicum corpus ad varia Naturæ obeunda munera ſuis integratum partibus, anatomici cultri vel ſaltem oculorum aciem non eludit; & licet quælibet ipſius pars omni vaſorum contexturâ donetur, variæ tamen in ipſo, velut in animalibus, regiones deſignari poſſunt. Inſignior pars occurrit, qua arbores, pleraque herbarum attolluntur: hæc radicibus quaſi laciniato ſui extremo affixa terræ, reliquo ſolvitur in ramos, à quibus folia, flores, & tandem ſemina pendent. Variis inſignitur nominibus; caudex enim, ſtipes, & truncus, dum in arboribus, caulis autem in herbis, ſpeciatim verò in fiſtuloris calamus appellatur, ſcapus in leguminibus, & culmus in frumentis vocitatur. Hæc velut inſignis thorax, magnaque Naturæ officina cenſenda venit; plurium namque vaſorum viſcerumque compage donatur, quæ ut facilius vegetent ſuoque in munere cuſtodita perennent, exteriori amictu foventur, velut animalibus accidit, quæ ſuis cooperiuntur integumentis. Exterius itaque hoc involucrum, quo quaſi corio Natura utitur ad contegendam totius plantæ peripheriam, Cortex dicitur, interdum Viſcus appellatur. Ut autem ad interiora rimanda viſcera pateat aditus, hujuſmodi primò examinandus venit, & exordio ſumpto à ſimplicioribus ad arborum implicatiores ſtructuras procedet exercitatio.

In *Tritico* itaque *Indico* 1. exterius, corticis loco, ſub cuticula per longum fibroſum rete *A* excurrit, diverſas areas *B* variæ figuræ efformans; evidentiùs autem patent, ubi ſubrubeſcit cortex. Exaratæ areæ utriculis replentur, quorum copiâ cauliculi reliqua moles componitur. TAB. 1.

In *portulaca*, præcipuè majori, 2. craſſior eſt cortex, ejuſque exterior ſuperficies tenui obvelata epidermide fibroſum rete *A* exhibet, parum eminens, cujus ſpatia utriculis *B* occupantur, qui diaphano ſucco turgent: Licèt autem confuſa ſerie diſponantur, & coaptentur, craſſam tamen zonam C, quâ corticis corpus excitatur, componunt: plurium angulorum conſtant formâ; magnitudo quoque varia eſt; exteriores namque *D* minores ſunt, medii verò ampliores. Utriculorum hæc zona ligneis fibris in cylindrum diſpoſitis nectitur.

Cichorii 3. cortex potiori conſtat partium apparatu, vel ſaltem, quæ veniunt in compagem, manifeſtiùs nobis patent. In hujus ſegmento horizontali exteriùs utriculi minimi *A* ſub tenui cuticula, pilis conſpersâ, locantur, horumque copiâ, tota corticis craſſities uſque ad ligneam ſubſtantiam *B* cauliculi ſcatet. Inter has, ligneæ fiſtulæ, ſeu fibræ, in faſciculum *C* coagmentatæ, per longum excurrunt; vaſa quoque *lactifera D* patenti hiatu lac effundunt: Nectitur autem ligneo cauliculo *B*, cujus deſcriptio inferiùs habebitur.

Manifeſtiùs exarata emergunt in craſſo *apii ruſtici* 4 cortice, cujus exteriorem portionem tenent utriculi *A* continuatâ ſerie deducti uſque ad ligni confinium *B*; ſub cuticula pariter diſparati ſituantur fibrarum lignearum faſciculi *C*, quibus ſectis, fiſtularum ora *D* patent. Conſimilis ordo versùs lignum *B* obſervatur, hujus tamen faſciculi *E* minores ſunt. Inter utriculos craſſitiem componentes, vaſorum, gummi, lactis inſtar, effundentium ora *F* patent, & pluribus ſeriebus diſponuntur.

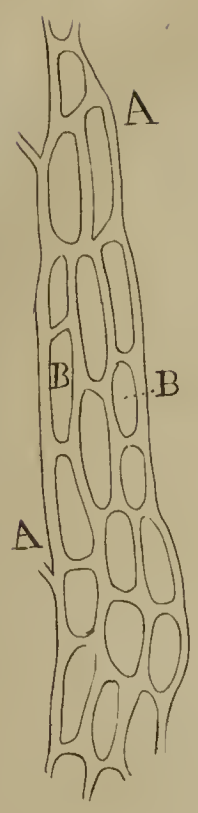
Quæ hucuſque luſtravimus in expoſitis plantis, ob exiguitatem non facilè ſenſus noſtros movent; ideò ſubobſcura latitant: Evidentiùs autem manifeſtantur indagatis corticibus Arborum, reliquorumque, qui ſimplici & diſtinctâ donantur compage.

In *Cannabis* 5 cortice, ablatâ cuticulâ *A*, quæ candidis ſpinis *B*, inferiora versùs recurvis, cooperitur, varii utriculi virides occurrunt, ſub quibus fibrarum multiplex rete conditur; cujus partem delineare placuit. Circa ligneam portionem, involucri inſtar, per longum fibræ, reticulari opere contextæ deducuntur; hæ licèt in faſciculos *C* colligentur, non unam perpetuò ſequuntur coſtulam, ſed frequenter proximo aſſociatæ faſciculo, cui brevi comites fiunt, iterum obliquatæ primo redduntur faſciculo. Ex hac itaque fibrarum divaricatione areæ D conſurgunt, quæ utriculorum E copiâ replentur invicem cohærentium, & horizontaliter ſituatorum. Succedunt ſubjectæ fibrarum contexturæ, quibus veluti tot involucris lignum circumdatur, quarum areæ ſenſim minores ſunt, & acutioribus pollent angulis, donec prope lignum *liber* excitetur, in quo fibrarum faſciculi parum obliquantur; unde minimæ ſunt areæ. Quælibet fibra, ſeu lignea fiſtula, tot quadratis ferè corporibus *F* invicem hiantibus conſtat.

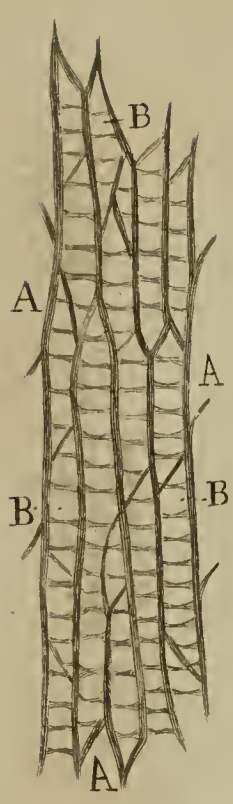
TAB. 2. In *ſalice*, & *populo* 6, evidentior emergit ſtructura; in hac enim exterior cortex aſper eſt; nam ſubcreſcentibus interiùs ſingulorum annorum incrementis, cuticula, cum dilatari nequeat, neceſſariò ſolvitur, unde, temporis diuturnitate, ſubjecti etiam corticis non pauca craſſities altis perfoditur ſciſſuris. Abrasâ itaque cuticulâ in *tenella populo*, rete occurrit, quod faſciculis *A* de more multiplicibus fibris coagmentatis conſtat; inæqualis magnitudinis & figuræ areæ *B* excitantur, ex varia fibrarum *C* obliquitate. A ſingulo faſciculo *A* pendent & exoriuntur utriculorum ordines *D*, qui horizontalem ſervantes ſitum, versùs lignum præcipuè diriguntur; unde per areas *B*, intrà elongatæ, corticis craſſitiem excitant; reliquæ verò ab exteriori faſciculorum *A* portione enatæ faſciæ, obſtante cuticulâ, & aeris inclementiâ, parum producuntur. Succedunt ſubjecta reticularia involucra, quorum ligneæ fibræ *E* ab exarata obliquitate recedentes, arctiores conſtituunt areas *F*, ſolitis utriculis refertas. *Liber*, ſeu interior corticis amictus, ligno contiguus, fibrarum *G* pari progreſſu per longum componitur, ut minimæ areæ *H* horizontaliter ductos utriculos, & in lignum ſe ſe inſinuantes admittant. Ingens eſt reticularium plexuum *I* numerus, quibus tota arbor ambitur, & inter hos pendentes utriculorum ordines & racemi *K* mediant; ſenſim tamen ita anguſtant ſpatia, ut minimi ferè intercipiantur utriculi inter reticularia involucra *L*, quibus *liber* componitur.

In

1.

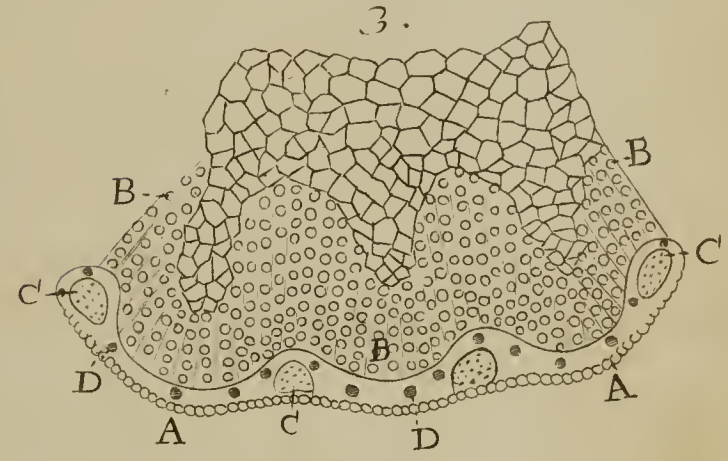

A
B
B
A

2.


B
A
A
B
B
A

C
C
D
D
C

3.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B
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C
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A
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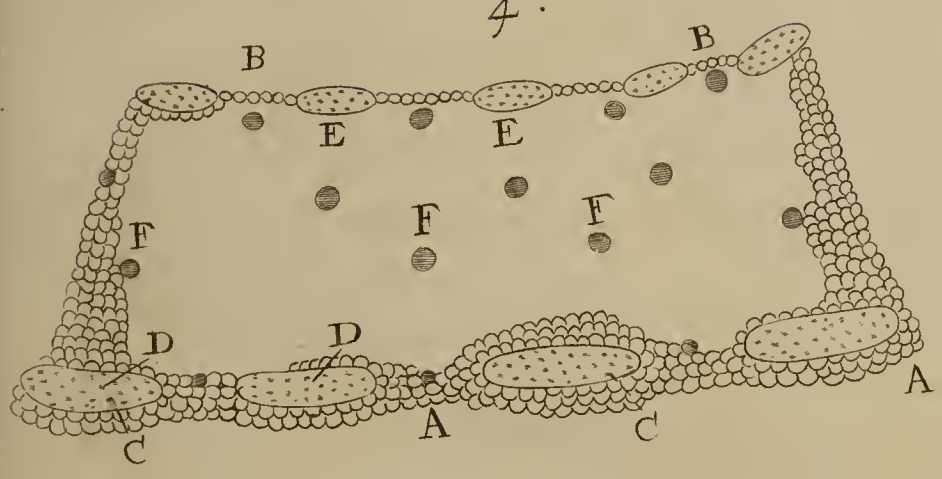
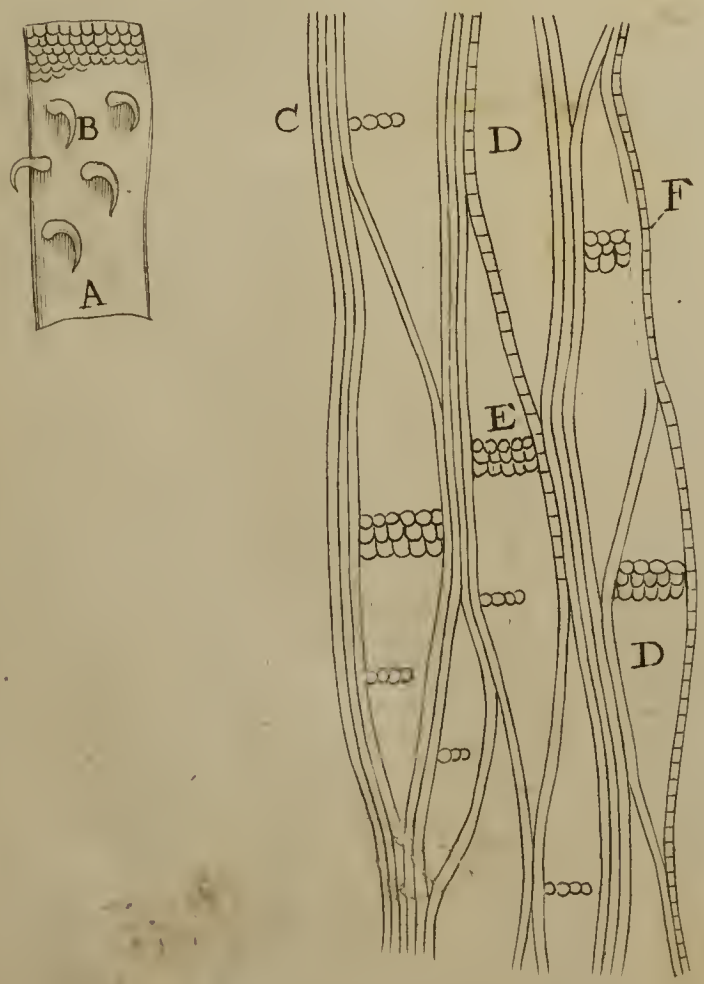
C
D

4.


B
B
E
E
F
F
F
D
D
A
C
C
A

5.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A
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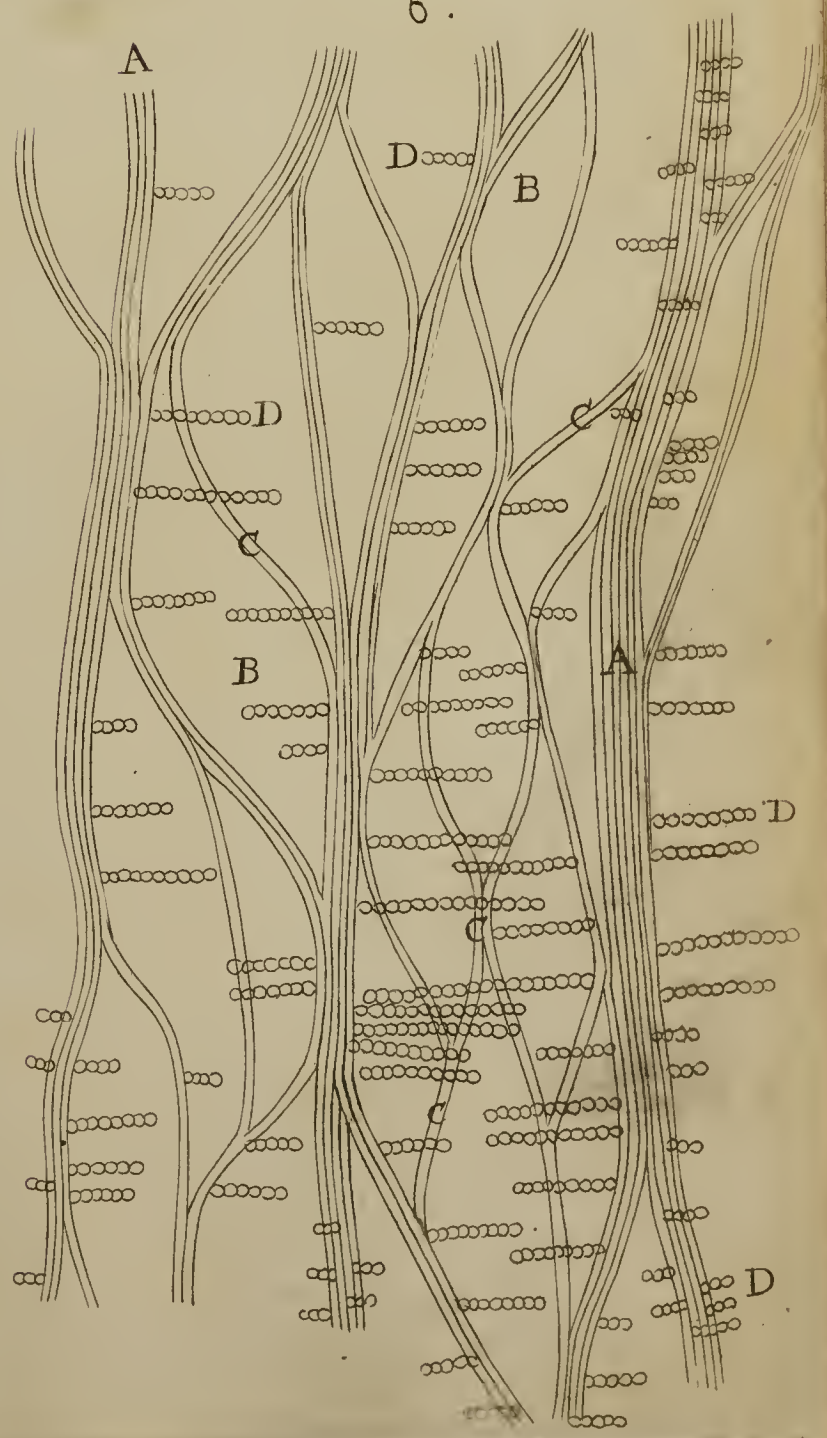
C
D
F
E
D

6.


A
D
B
D
C
C
B
A
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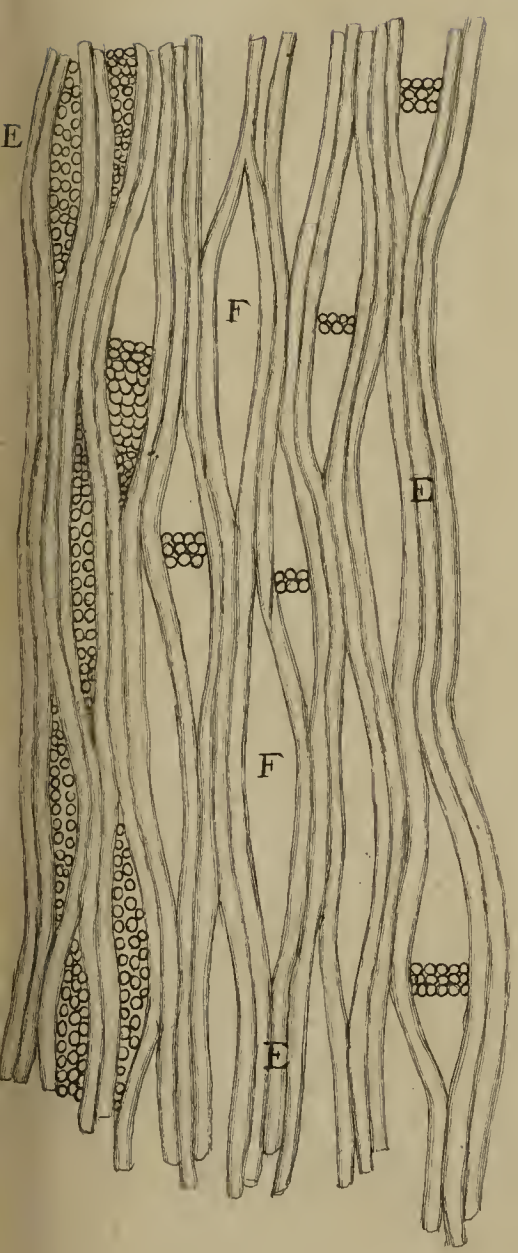
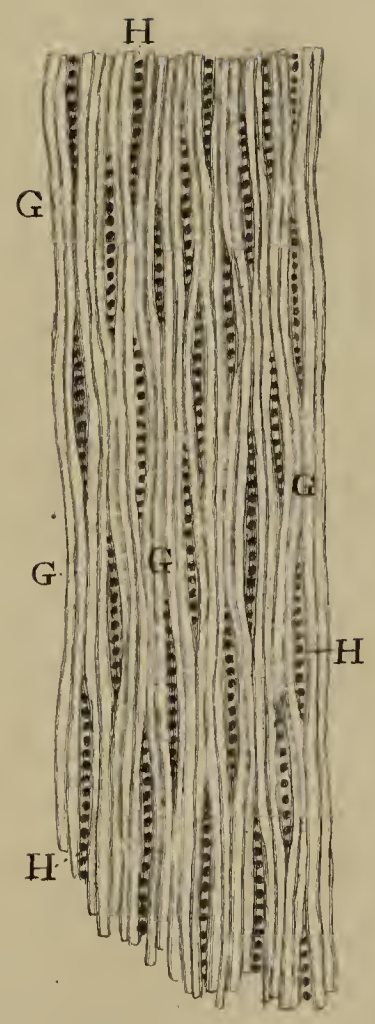
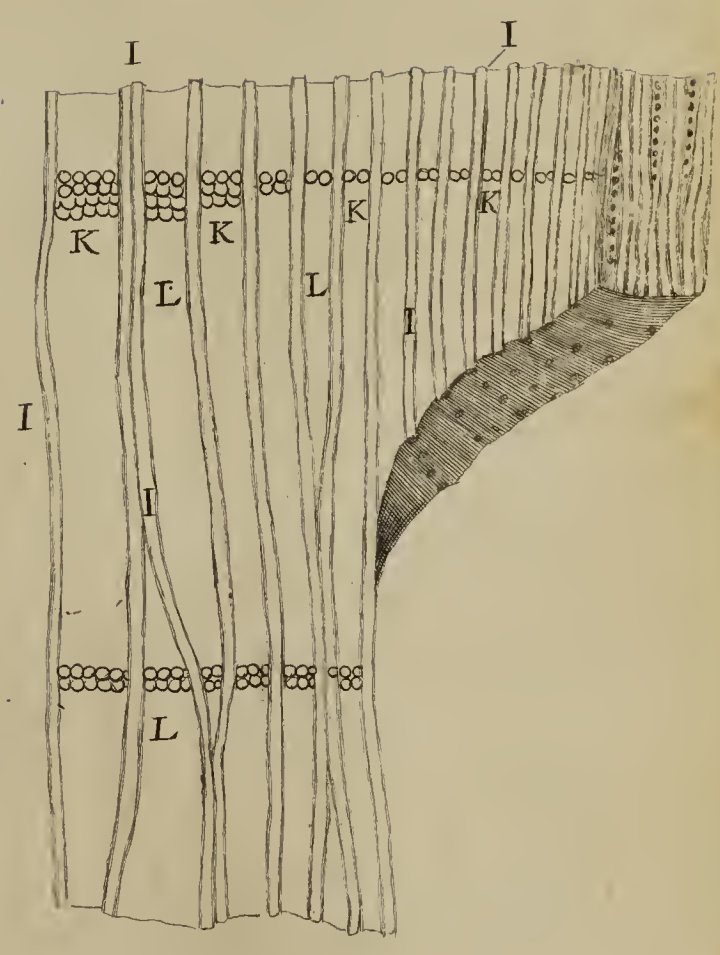
C
C
D

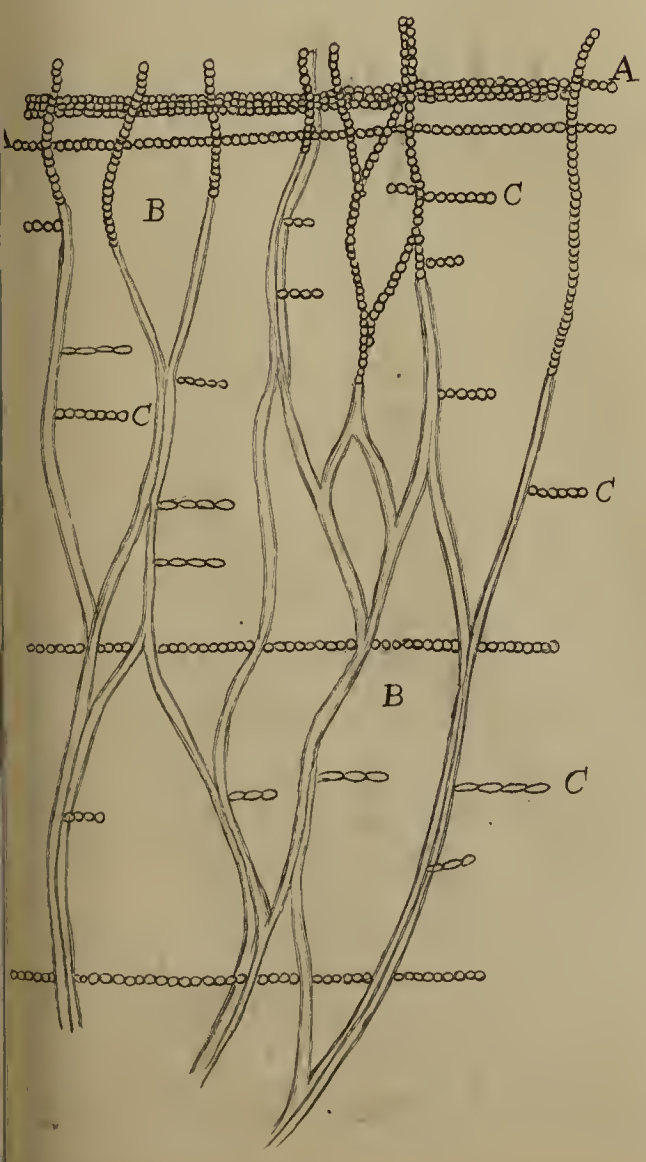
6

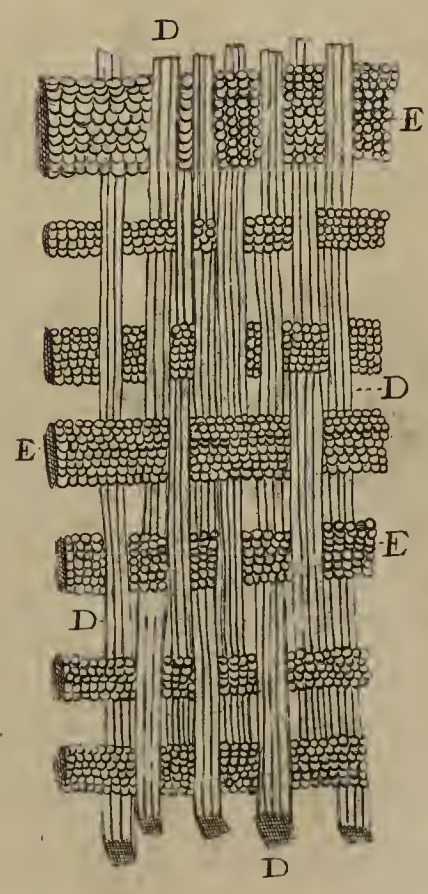


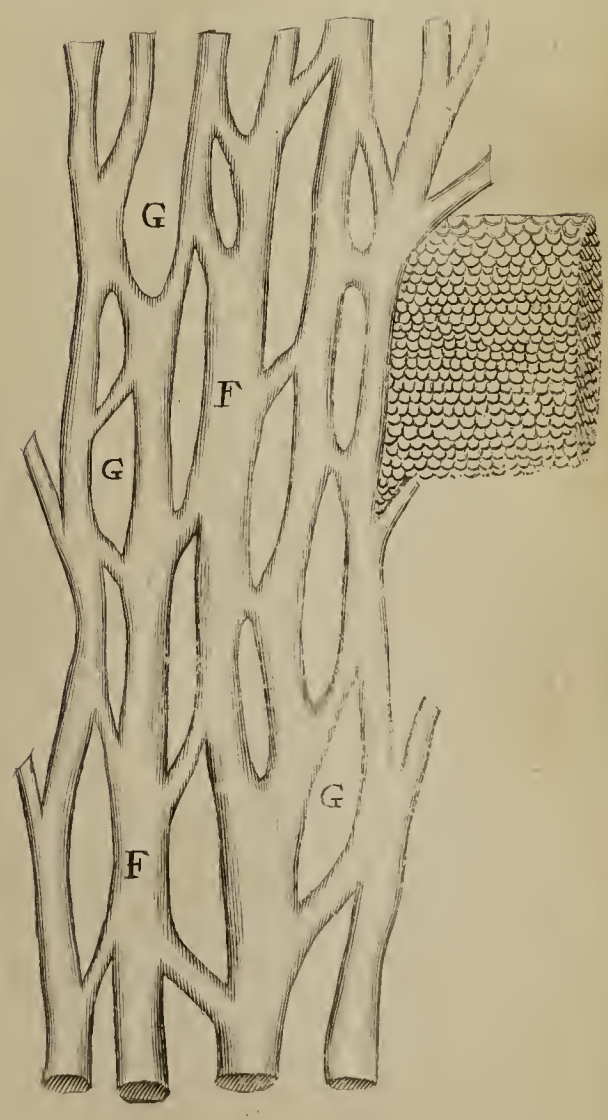




F. 7.







In *ceraſis* & *prunis* 7, elegans quoque ſuccedit *corticis* ſtructura, in quâ adhuc tenellâ, utriculorum horizontales ordines *A* ſub cuticula patent, quibus veluti tot annulis univerſa atbor cingitur. His avulſis, laxum fiſtularum *B* rete per longum & latum extenſum ſeſe offert, quæ variè & obliquè ductæ inæquales excitant areas. A fibrarum faſciculis pendent de more utriculorum ſeries *C*, quæ partim versùs lignum producuntur, partim, extrà elongatæ, cum urgente cuticula nequeant foras erumpere, & turgere, ad latera flectuntur, & in girum horizontaliter ductæ faſciam *A* efformant; quæ in *ceraſo* præcipuè laceratione manifeſtatur. Exaratæ fibræ evidenter fiſtuloſæ ſunt, unde cum diaphanæ ſint, ſubrubrum indicant contentum ſuccum, quo non rarò turgent. His avulſis, ſuccedunt reliquæ fibrarum implicationes, quibus corticis craſſities componitur. Eleganter itaque implicantur fibræ, & horizontales utriculorum ordines; ut luſtrata corticis craſſities fibrarum varios plexus *D* ſeſe invicem continentes exhibeat, qui obliquè per longum producti, utriculorum ordinibus *E*, versùs lignum propagatis, locum præbent, & ita quaſi ſuperequitationes fiunt. Poſtrema corticis ſuperficies, quæ ligno nectitur, craſſis fibrarum faſciculis *F*, ſucco turgidis, componitur, quarum divaricatione evidentes ſubſiſtunt areæ *G*, quæ utriculorum ſeriebus, in lignum ſeſe inſinuantibus, pervaduntur.

Non diſpar compages deprehenditur in *quercu* 8, cujus cortex exteriùs aſperitatibus altiſque foveis ſcatet, contabeſcentibus utriculis, & vaſculis, quibus primò excitabatur; in tenellis autem corticibus nondum tabefactis occurrit horizontalis utriculorum quaſi faſcia *A*, quâ extima ſuperficies componitur; ſub hac fibroſum rete de more perpendiculariter, velut amictus, locatur, cujus vaſorum faſciculi *B* per longum producti invicem implicantur, areæque *C* excitantur, quas utriculorum horizontaliter versùs lignum ducti ordines *D* occupant. Plures ſunt fibrarum ſeſe continentium ordines, inter quos implicatio quoque reticularis ſuccedit. Spatia ab obliquitate fiſtularum relicta, anguſtiora ſenſim redduntur, quæ utriculorum ſeries lignum penetrans pervadit. Hæc autem, luſtratâ corticis craſſitie, obvia fiunt; nam ab exteriori ejuſdem ſuperficie uſque ad *librum*, penè innumeri obſervantur fibroſi amictus *E*, qui interdum communicatâ invicem fibrarum portione *F* implicantur: Inter hos utriculorum ordines *G* ſituantur, quorum perpetua inclinatio versùs lignum ſuccedit. Hoc peculiare tamen obſervatur in *quercu*, quod *populo* interdum & aliis familiare eſt; inter utriculorum ſeries dari corpora *H*, teſſerarum inſtar, obtuſis tamen angulis ſolida, & ferè oſſea, quæ utriculorum rectis ordinibus coagmententur; quę quaſi tartaro concreto turgida, denſum & obdurum excitant corpus. Hujuſmodi vero tartarizata corpora *H* irregulariter ſituantur, & in tenellis etiam corticibus, minora tamen, concreſcunt. Aliud pariter in cortice & ligno *quercûs* obſervandum contingit; præter enim tranſverſalium utriculorum ordines *G*, quibus minimæ areæ *libri I* occupantur; frequentes etiam interſeruntur horizontales zonæ utriculorum amplæ, quæ à cortice in lignum deducuntur; TAB. 3.

tur; hæ ut plurimùm mollibus utriculis ſucco turgidis complentur, interdum petrificantur, & ſaxeę excitantur portiones *H*.

Analogam exaratę ſtructurę compagem in quibuſdam Fruticibus obſervamus, & prȩcipuè in *rubo* 9, cujus rami in cylindricam, quandoque quadratam, formam inclinant. Hi per tranſverſum ſecti craſſum ſuperinductum exhibent corticem, qui exteriùs cuticulâ ambitur; in reliquo autem viridibus utriculis *A* variè configuratis componitur: In horum medio, fibrarum lignearum faſciculi, ſemilunarem formam æmulantes *B*, continentur, & exteriorem longitudinem pervadunt, ipſarumque ora patent. A cortice interim, utriculis *A* excitato, ejuſdem portiones *C* versùs medullam elongantur, veluti tot lineæ à circumferentia in centrum ductę; & inter has corticis productas portiones lignea ſubſtantia *D*, quę ſecta per tranſverſum, pyramidem dèſcribit, locatur.

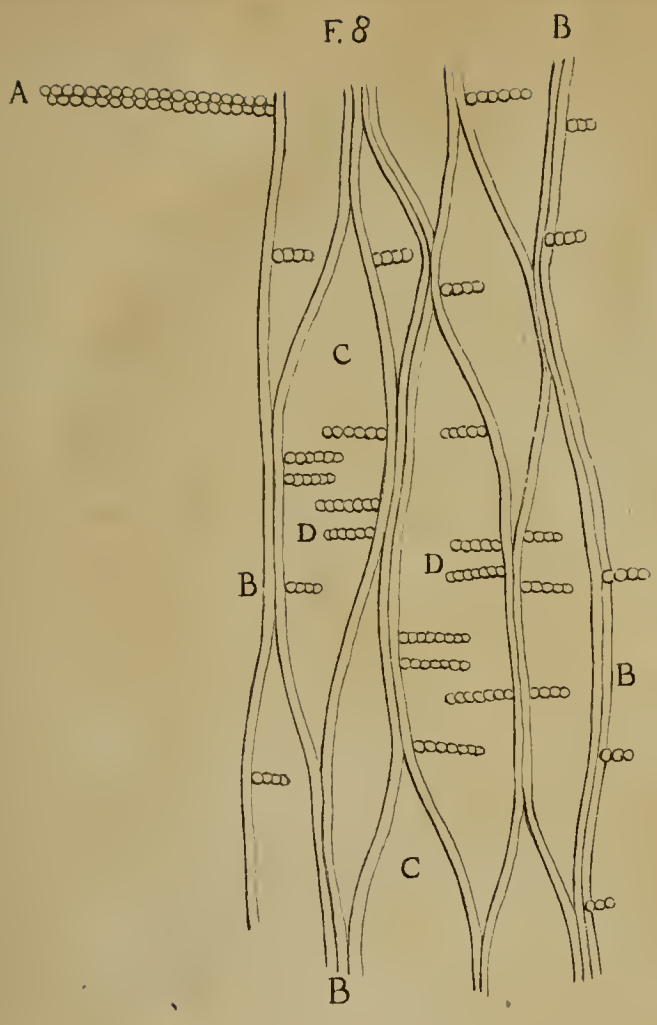
In *Vitis* pariter ſegmento 10, paucorum licèt menſium, craſſus extenditur cortex, cujus utriculi exteriores exſiccati, & tabidi, epidermidem conſtituunt; reliqui *A* inæquali pollentes formâ, amplum ſemiſphericum amplexantur fibrarum faſciculum *B*, quę hiantibus orificiis patent. Eadem corticis compoſitio versùs lignum producitur, & quatuor, quandoque plures, fibrarum faſciculos *C* amplexatur & ſtipat, vel ſatiùs, ab his pendet diſtinctus in ſtirias. Ab hac corticis congerie versùs centralem medullam exporriguntur productiones *D*, oblongis utriculis horizontaliter ductis excitatę, quę, ligneas portiones *E* hinc inde ambientes, in medullam laxantur.

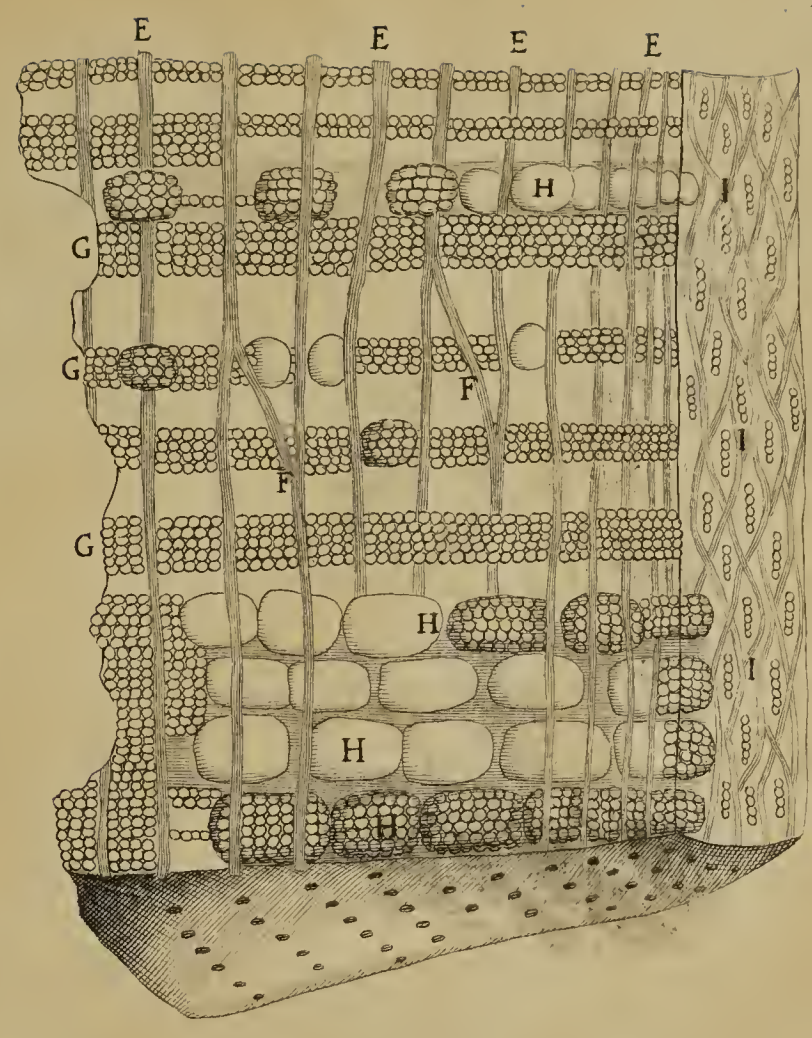
Tam varie excreſcunt utriculorum ordines, quibus cortex componitur, ut in aliquibus extrà erumpentes, monſtruoſos pariant tumores; hos in *opio* & *ulmo* præcipue 11 miramur. Nam in hujus tenello ſurculo *A* ſeni exigui attolluntur tuberculi *B*, à quibus cuticula *C* dirumpitur, & paulatim horizontalibus utriculorum ordinibus *D* congeſtus humor monſtruoſum reddit ſurculum.

Jam indagatis ſingulis partibus, quibus *cortex* in diverſis vegetantium generibus componitur; fas eſt, ut poſtremò ſtructuram addam, qua peculiare vaſorum genus magis eluceſcat. *Abies* 12 itaque in tenellis prȩcipuè ramis, ſuo gaudet cortice molli, nec multùm exteriùs aſpero; hic per tranſverſum ſectus, utriculorum ſeries *A* prȩcipuas, versùs lignum directas, patefacit; reliquum diverſis fibrarum involucris *B* excitatur: Non longè tamen ab extima prȩcipuè regione, vaſorum ora *C* diverſę figurę patent, quę *terebinthinam* fundunt. Hȩc tubuloſa ſunt, & gibboſitatibus *D* ſcatent, & interdum obliquè ducta conſociis anaſtomizantur vaſculis.

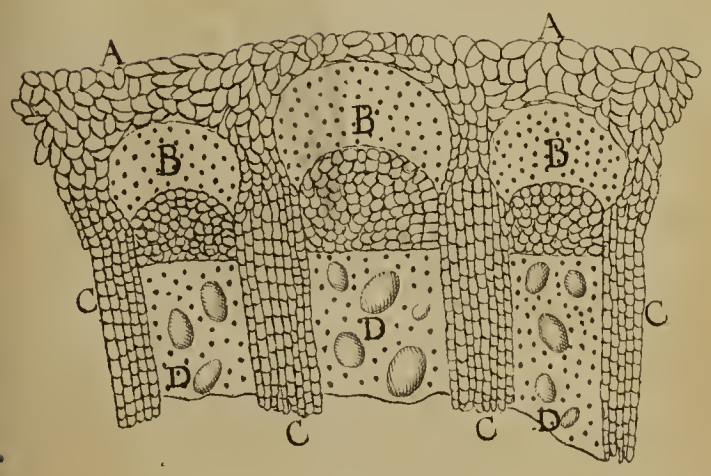
Luſtratę hucuſque in variis vegetantibus *corticis* ſtructurę nobis indicant, hunc multiplicibus integrari particulis; inter quas, primas obtinere videntur *fibræ ligneæ*, quę antiquitùs nervi, filamenta, & pectines, appellabantur: Sunt autem tubuloſa corpora ſubingredientibus liquoribus pervia, ipſarumque ſtructura tot quadratis conſtat corporibus, concavis, invicem hiantibus. Vaſa hȩc nec recta, nec parallela ducuntur; ut plurimùm

F. 8

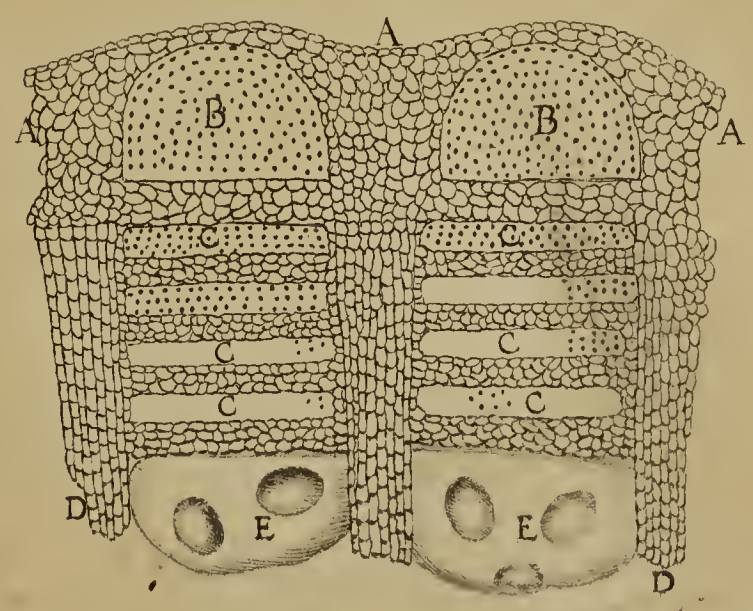




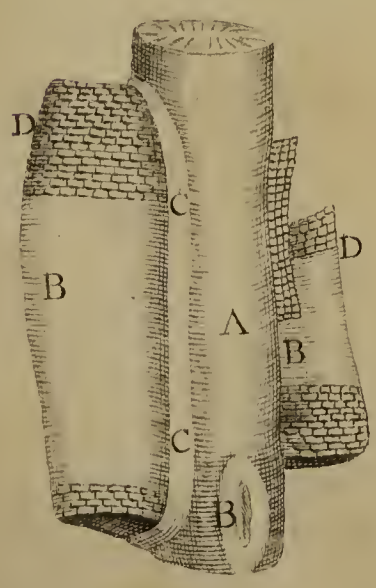
F. 9



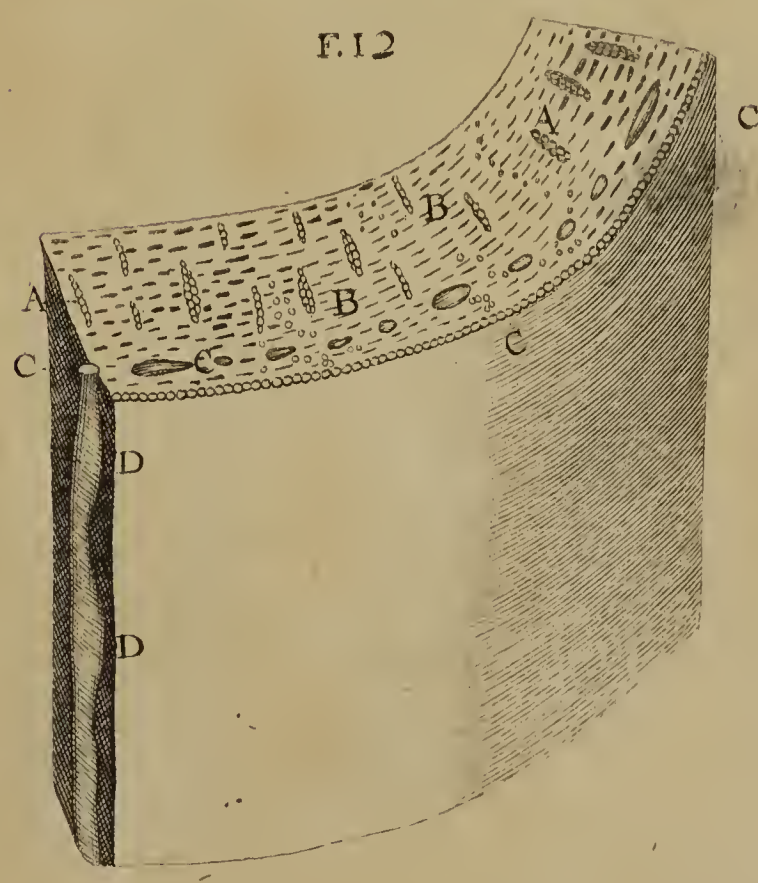
F. 10



F. 11.

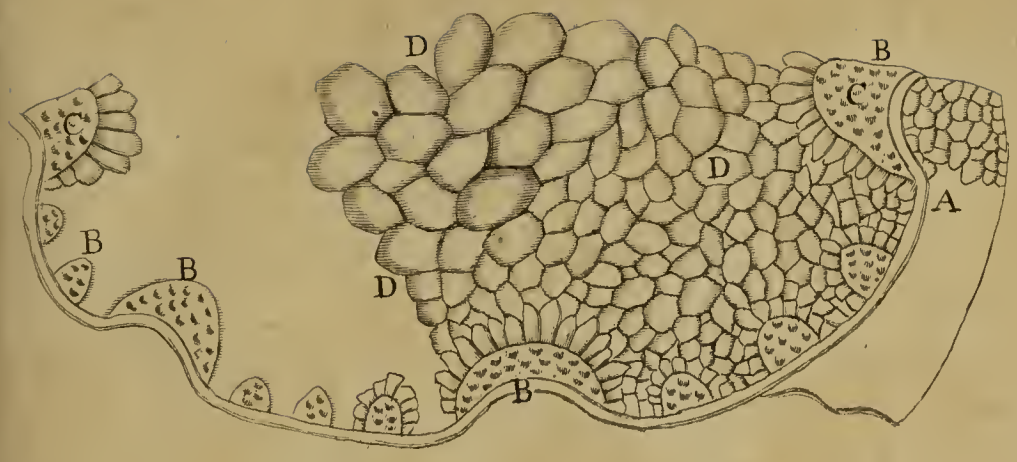


F. 12

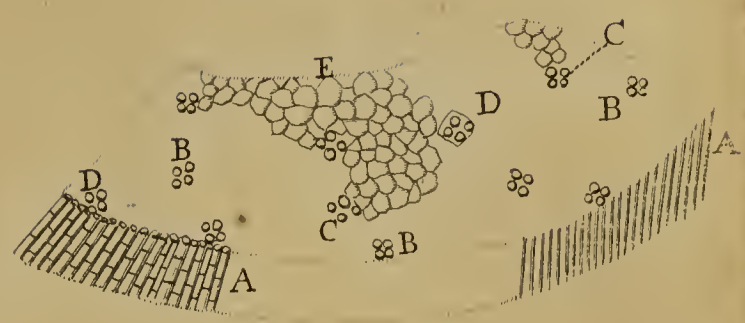


TAB IIII.

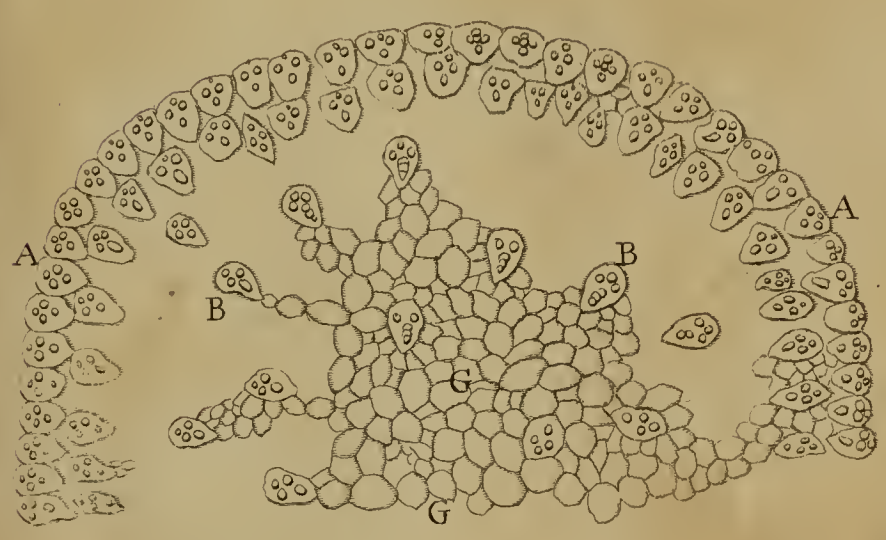
F. 13

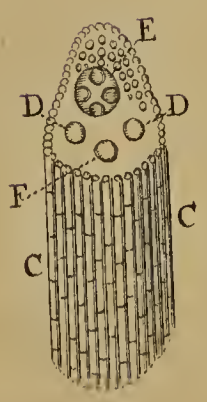


F. 14



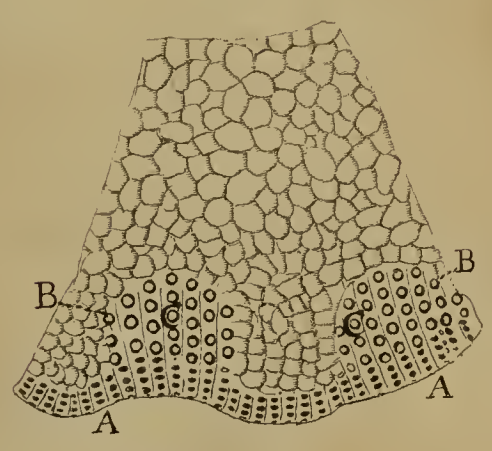
F. 15



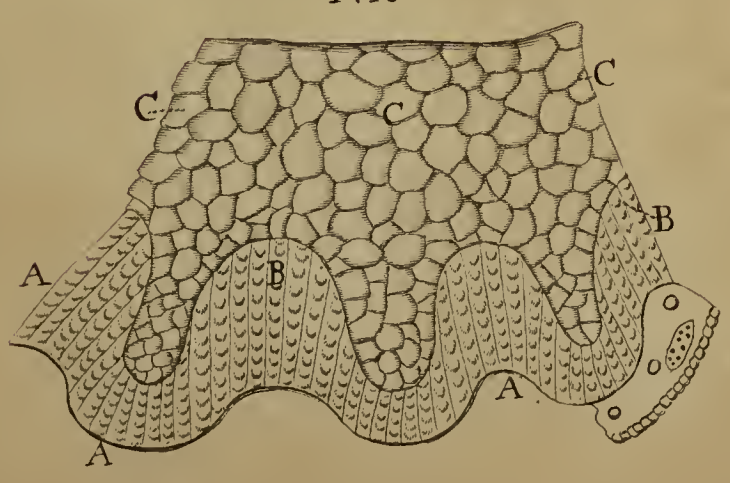


F. 16

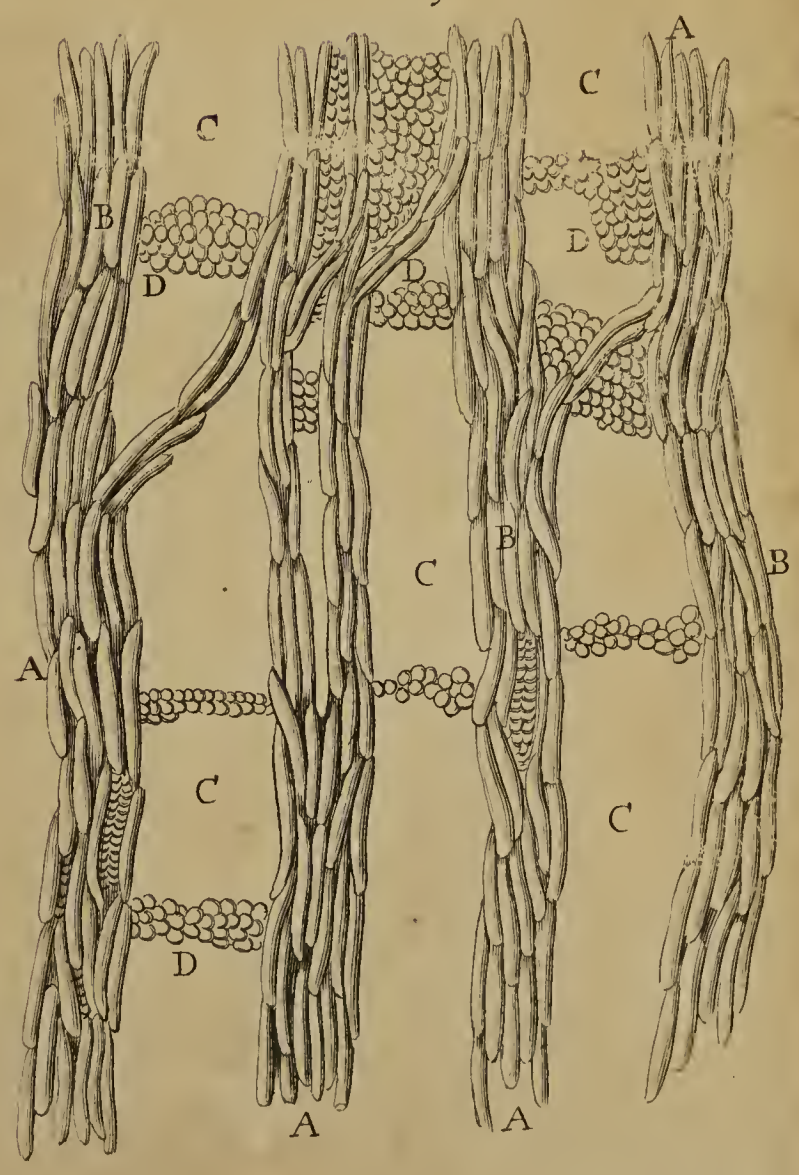
F. 17



F. 18



F. 19



mùm in faſciculum coagmentantur. Horum aliqua iterum inclinata, & ſeparata, rete efficiunt, unde tot delineata reticularia involucra, quibus lignum ambitur. Subintrans itaque humor ſurſum aſcendit, & quaſi ſuſpenditur; ſingula namque portio, quæ invicem fibrarum fruſtula unit; cùm parum interiùs emineat, *valvulæ* vices ſupplet, & ita minima quælibet guttula veluti per funem, ſeu per gradus, ad ingens deducitur faſtigium. Hunc autem aſcenſum non tantùm fiſtularum interior aſperitas juvat, ſed & ſucceſſiva aëris temperies, (calida *ſc.* & frigida, ex diei noctiſque variis craſſibus,) ejuſque elaſticus motus, qui exteriora corticis involucra urgens, contentorum liquorum motum ſuperiora versùs promovere & juvare poteſt; quæ ſingula ſagacioribus Mechanicis demonſtranda relinquo. Ab expoſitis fiſtulis horizontales utriculorum ordines pendent, & erumpunt: Etenim dum tenelli adhuc corticis fiſtulæ vi evelluntur, continuatæ utriculorum appendices ſubſequuntur; & *gallarum* diligens indago hujuſmodi exortum præ cæteris indicat: quod Foliorum & Pericarpii icones abundè demonſtrabunt. In hos igitur tranſverſales utriculos aſcendens humor, *chyli* inſtar, exoneratur, ibique longiorem paſſus moram, antiquiori ſucco intimè commixtus, & fermentatus, in naturam alimenti exaltatur; unde in quibuſdam vegetantium utriculis, præter inutilium tranſpiratum, debitæ ſuccedunt prȩcipitationes, tartareȩ prȩcipuè materiȩ, non diſpari ritu, ac fit in elicitis quibuſdam vegetantium ſuccis, diu in naturam vini fermentatis, à quibus tartareȩ prȩcipitatȩ partes, circa continentis vaſis ſuperficiem ſubſidentes, concreſcunt. Hujus itaque concretione continentium utriculorum ordines petrificantur, ut in *quercus, populi*que cortice, teſſerarum ſub forma, admirati ſumus. Copioſus admodum in corticis hujuſmodi horizontalibus appendicibus excoquitur ſuccus, qui ligno reliquiſque plantarum partibus diſtribuitur; unde nil mirum, ſi cortex abundantius & validius pabulum, præ reliquis plantarum partibus, igni ſubminiſtret.

An expoſiti humoris concoctio in utriculis celebrata nutritivum illum ſuccum edat, quem in *cupreſſo*, *pino*, & *abiete* terebinthinæ ſpecie miramur; in aliquibus, ut *ficu*, *tithymalo*, *cichorio*, *apio ruſtico*, &c. lactis inſtar, dubitari poteſt. Peculiaria enim hæc vaſcula, (*arteriarum*, vel ſaltem *nervorum*, inſtar,) non ſolum corticem, ſed & lignum, & reliquas vegetantium partes irrigant, & concocto turgent ſucco, qui longè elaboratior videtur ac eſt humor ligneis fiſtulis contentus.

Præter exaratam alimenti coctionem, peculiari videtur *cortex* muneri dicari; auctioni *ſcil.* & vegetantium incremento: Arborum enim augmentum contingit, (ut ſuo loco indicabitur,) novis ſingulo anno additis fibrarum involucris, quæ horizontalibus utriculorum ſeriebus implicita ſenſim ſoliditatem nanciſcentia, tandem veram ligni obtinent ſubſtantiam. In *libro*, Natura quoquo tempore fibrarum ordines de novo excitat, vel ſaltem augmento manifeſtat, quas deferendæ alimoniæ, permittente mollitie, aſſueſcere cogit, & tandem firmatas, contiguis ligni partibus hærentes applicat, & ita fit novum, inductâ ligni zonâ, trunci & ramo-

rum augmentum. Ex hoc colligere fas est, præcipuam arborum partem esse corticis portionem, quæ ligno nectitur, cujus ope plantæ vitam perpetuant, (ut in *salice*, *populo*, & *oleis* experimur;) & auctiores redduntur trunci; germinatio item & fœcunditas succedunt. Hinc loco tutelę exterior corticis portio, quæ plurimum aeris injuriâ, & transpiratu tabefacta, exanimis & rigida redditur, *libro* additur, qui & interiùs etiam subjectum lignum non parum tutatur. Quare probabile est, plantas, quarum caules annotini sunt, vel saltem per longum tempus non durant, nec ligneâ portione in cylindrum coagmentatâ gaudent, à Natura cortice privari, solâque cuticulâ, vel exiguis fibrarum fasciculis donari; in reliquis verò, in quibus per longum tempus exigitur augmentum, in cortice, velut in prima staminum delineatione, lignearum fibrarum ordines in *libro* parari, & deponi, ut stato tempore auctiores emergant.

De partibus Caulem vel Caudicem componentibus.

A Vulso lustratoque cortice, *caudicis* seu *caulis* corpus occurrit, quo arboribus & herbis firmitas conciliatur. Thorax est multis vasorum generibus visceribusque compactus, quę uno *Ligni* nomine in arboribus antiquitas complectebatur; distinctiùs verò, fibrarum, nervorum, carnis, seu pulpæ, & medullę appellationibus distinguebat. Hæc autem tam exiguam sunt sortita molem, tamque invicem implicita propagantur, ut pro sui examine longam exigant indaginem.

Simplicior igitur contextura in tenellis caulibus *herbarum* occurrit, & præcipuè in *Portulaca majori* 13; quæ per transversum secta, immediatè sub cortice, qui variis utriculorum seriebus *A* constat, inæqualis magnitudinis fasciculos fibrosos *B* exhibet: Hi ligneis fistulis per longum ductis, persimilibus jam deprehensis in cortice, constant; in medio verò alia hiant vasa *C*, quę perpetuò patula sunt, & *spiralia* interim appellare licebit. A fibrosis fasciculis pendent utriculi *D* oblongi, qui sensim majores fiunt, pluribúsque scatent angulis, ut faciliùs invicem adaptentur: Levi excitantur, pellucidâ diaphanaque membranâ, & decolori turgent humore. TAB. 4.

In *tritici* culmo 14, reliquisque consimilibus, tenuis licèt, quasi fistula & tubus, excavatur cylindrica caulis substantia. Consimili gaudet partium apparatu: Exteriùs etenim loco corticis varii utriculorum ordines *A* excurrunt, qui inæquali magnitudine pollentes, ut plurimùm angulares sunt. Non longè ab his lignei fasciculi locantur, quorum tres frequenter numerantur ordines *B*; singulos ipsorum lignei tubuli & fistulę exteriùs componunt, & tres spirales fistulas *C* amplexantur orificiis perpetuò hiantibus. Non longè ab his quartum occurrit vasculum *D*, quod *proprium* censeo: Reliquum areæ, utriculis *E*, qui facilè exsiccantur, & deplentur, sese invicem urgentibus coagmentatur.

In

In *grano Turcico* & *Indico* 15, eadem ſtructura, copioſiori tamen munificentiâ, eluceſcit; exteriorem namque caulis circumferentiam, gemini, & quandoque plures, faſciculorum ordines *A* per longum producti tenent. Conſimiles pariter faſciculi *B* per reliquum areæ diſperguntur, irregulari ſitu locati. Quilibet faſciculus lignearum fiſtularum *C* congerie conſtat, & interiùs tres ſpirales fiſtulæ *D* continentur, quarum amplior *E* quatuor frequenter amplexatur. Non longè ab his peculiare hiat vaſis os *F*, quod proprium reddit ſuccum; reliquum areæ fiſtularum ora exhibet. Exaratos itaque ligneos faſciculos varii utriculi *G* ambiunt, inæqualiter configurati, lucidâ excitati tunicâ, ſuccóque diaphano turgidi. In *cinarâ* eadem mirari licet, ubi partes ſolidiores redditæ ligneam magis ſapiunt naturam.

Parem partium compagem *filicis* caulis 16 poſſidet. Hujus varii, copioſique faſciculi lignei *A*, abſque ordine ſituati, diverſimodè configurantur, & in medio lignearum fibrarum ſpirales fiſtulas *B* hiantes cuſtodiunt: Fulciuntur autem, & quaſi ſtipantur, utriculorum ordinibus *C*, qui interdum longè minores ſunt exaratis fiſtularum orificiis. In *palma*, & *arundine Indica* ferè ſimilis obſervatur contextura; diſperſis enim fibroſis faſciculis & ſpiralibus fiſtulis compaginatur, ambientibus hinc inde utriculorum ſeriebus.

Minori licèt partium *apparatu* procedat Natura in *herbaceis* quibuſdam caulibus, majori tamen *ordine*, multumque proximo ligneæ *arborum* portioni incedit, ut in *endivia* miramur 17; circa cujus exteriorem oram ligneæ portiones *A*, in quibus fiſtularum ſpiralium ora aperiuntur, verſùs centrum quaſi tot lineæ diriguntur, & hinc inde minimorum utriculorum gracilibus ordinibus ambiuntur, ita ut involucrum fiat ſolidum & denſum. Interiora verſùs, inſigniores locantur faſciculi *B*, qui grandioribus ſpiralibus fiſtulis *C* & ligneis fibris compaginantur: Tota pariter area ſacculis ſeu utriculis angularibus lucidis excitatur.

In *Cichorio* 18, pariter item lignei faſciculi *A*, oblongiores redditi, multis fiſtularum ſpiralium orificiis *B* pervii ſunt, & reliquum utriculorum ſerie *C* repletur.

A *caulium* indagine, tranſitum faciamus ad firmiorem ligni compoſitionem, in *Fruticibus* & *Arboribus* detegendam. In *rubo* igitur, & *vite* 19, avulſo cortice, (cujus deſcriptionem ſuperiùs habuimus,) ſi exterior ſuperficies per longum examinetur, arctum rete, ex fibrarum faſciculis *A* excitatum, ſeſe offert: Hujuſmodi autem fiſtulis ligneis compaginantur, quæ quaſi vermicularibus tubulis *B*, invicem hiantibus, componuntur, quorum productio flexuoſa eſt: Tenui conſtant membranâ, & exteriùs & interiùs per longitudinem ligni excurrunt. Intermediæ areæ *C* tranſverſalibus utriculis *D* occupantur, qui horizontaliter à cortice deducti in medullam deſinunt. Patent autem ſecto per tranſverſum ramo ſeu caudice; hujuſmodi etenim in faſciculum ſeu faſciam *E* recollecti, veluti tot rotæ radii à circumferentia exorti, in medullam *F* quaſi in axem diriguntur; non tamen omnes ipſam attingunt, ſed frequenter alternatim gracilior ſub-

TAB. 4. & 5.

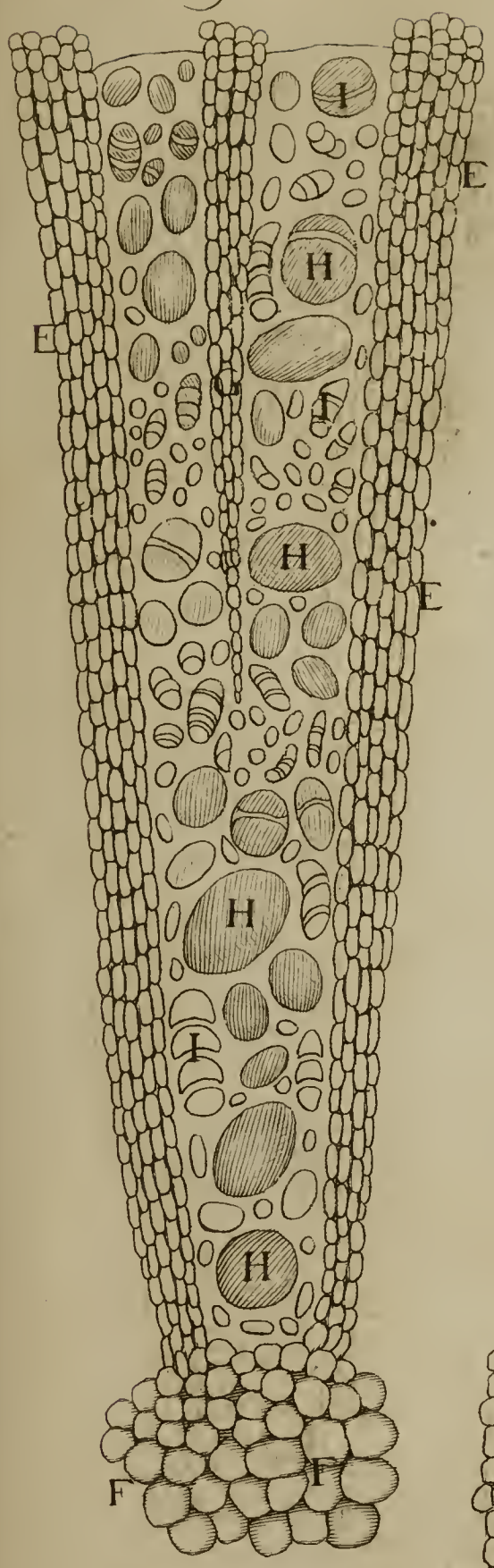
orta

orta faſcia *G* versùs interiora ligni obliterari ſolet. Componentes utriculi licèt omni ferè conſtent formâ, perſæpe ovalem poſſident configurationem, & in conſumptis lignis argentei ſunt. Cortici adeò hærent, ut ipſius productiones evidenter videantur, quæ ſtatim ac à ligneis particulis lateraliter urgentibus proſiliunt, in medullam laxantur : Hæc amplior eſt in ſurculis, ac eſt in antiquioribus ramis ; & utriculis ſeſe anguſtantibus, grandioribus tamen ac in reliquo cortice, componitur. Intercepta area in delineato ſegmento inæqualia ſpiralium vaſorum ora *H* exhibet : Horum forma frequenter ovalis, vel ſaltem rotunda eſt, interdum angularis; & quandoque plures hujuſmodi fiſtulæ ita ſeſe urgent, ut ſemilunaria orificia juxta ſe poſita *I* efforment. Ambiuntur autem à fibrarum lignearum continente ſatellitio, & ab intercurrentibus tranſverſalium utriculorum ordinibus firmantur. Singula hæc diſtinctiùs occurrunt ſecto per longum ligno : Interior namq; perpendicularis altitudinis ſuperficies ſpiralia vaſa *K* inæqualis magnitudinis offert ; hæc tubuloſa ſunt & ſubrotunda, identidem tamen anguſtantur, & perpetuò patent, nullumque, ut obſervare potui, effundunt humorem : Argenteâ laminâ *L*, in ſpiram contortâ, componuntur, ut facilè laceratione, (velut in bombycinis tracheis expertus ſum,) in hanc oblongam & continuatam faſciam reſolvantur. Lamina hæc, ſi ulteriùs microſcopio luſtretur, particulis ſquamatim componitur ; quod etiam in tracheis inſectorum deprehenditur. Spiralibus hiſce vaſculis, ſeu ut veriùs loquar, tracheis, ligneæ fibræ *M* adſtant, quæ ſecundùm longitudinem productæ, ad majorem firmitudinem & robur, tranſverſalium utriculorum ordines *N* ſuperequitant, ita ut fiat veluti ſtorea.

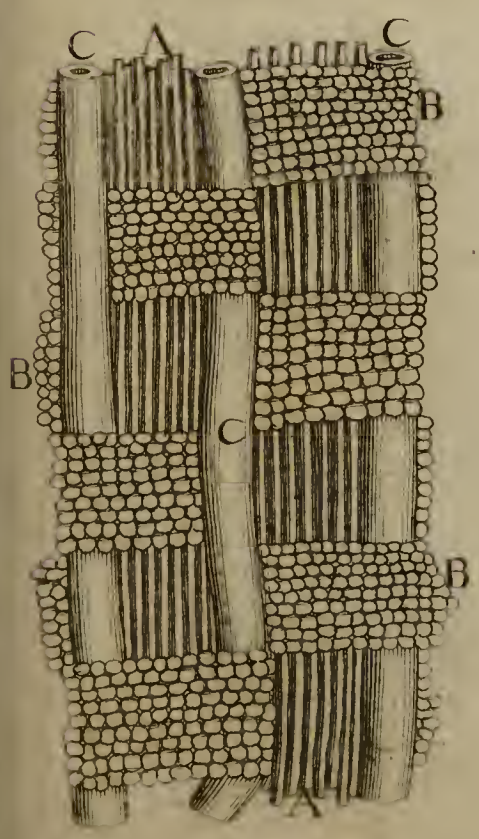
In *arboribus*, quibus ingens aſſurgit truncus, variè pariter inſeruntur componentes ipſius partes ; quare, detracto cortice, in lignea portione, caudicem, ramos majores & minores excitante, elegans occurrit ſtructura ; quam
TAB. 5. & 6. primò in *ſalice*, & *populo* 20 perquiremus ; quæ ut promptiùs & clariùs pateat, ligneæ portionis ſectio perpendiculariter à cortice in medullam fiat : Copioſæ etenim emergent ligneæ fiſtulæ *A*, quæ quaſi parallelæ deducuntur, & tranſverſalium utriculorum ordines *B* ita ſuperequitant, ut firmus fiat nexus. Hujuſmodi tranſverſales ordines à cortice emanantes, versùs medullam horizontaliter deducuntur ; non tamen ſinguli ipſam attingunt, ſed novi, non longè à medio ſuborti, eandem implicationem, dum versùs centrum deducuntur, ſubeunt. Inter ligneas fiſtulas *A*, ſpirales fiſtulæ *C* longitudinem excurrentes locantur, quæ patulo ore jacent.

Non minori vaſorum apparatu & implicatione excitatur *roboris* & *quercus* 21 lignum, quo truncus reliquique rami conſtituuntur. Exteriùs per longum ligneæ fiſtulæ *A* excurrunt, obliquæ tamen, ut areæ *B* reſultent, pro diverſis utriculorum ſeriebus horizontaliter ductis. Præter has areas, alia inſuper à laxatis curvatiſque fibris ampliora excitantur ſpatia, oblongâ & angulari formâ prædita, quæ inſignes veluti faſciæ, utriculorum ordines *C* replent. Interiorem perpendicularem regionem, ferè totam, fibrarum moles *D* occupat, quæ obliquè per longum ductæ talem ſortiuntur implicationem, quam ruditer adumbrare tentavi : Hujuſmodi fiſtulæ tubuloſæ

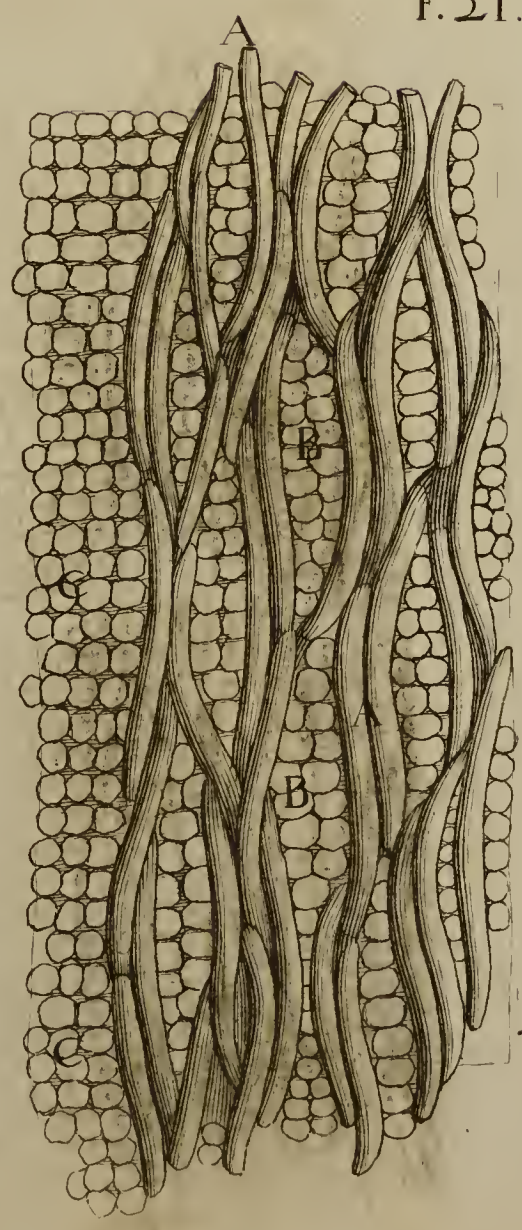
F.19.

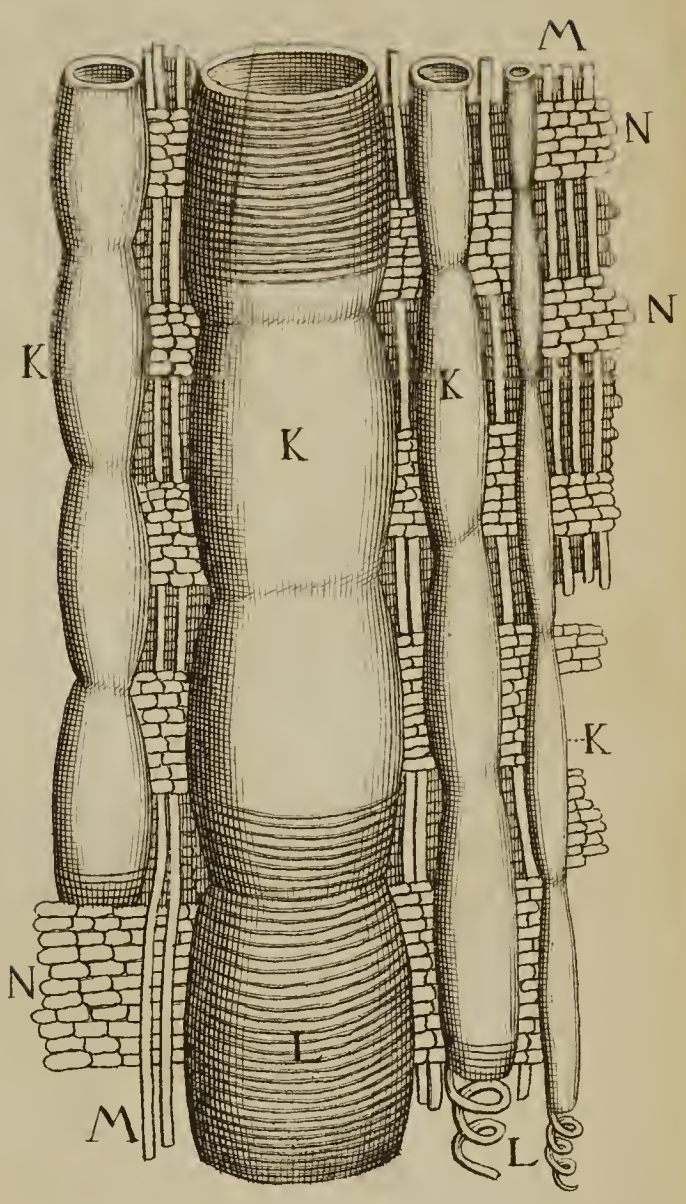


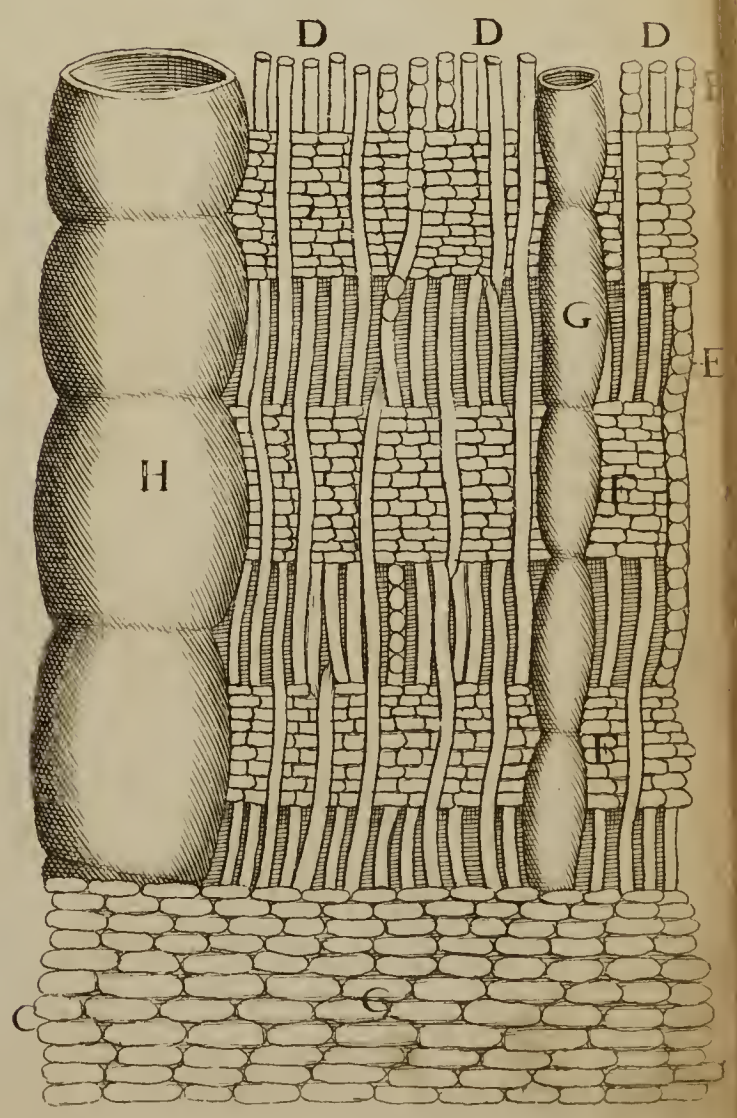
F.20.



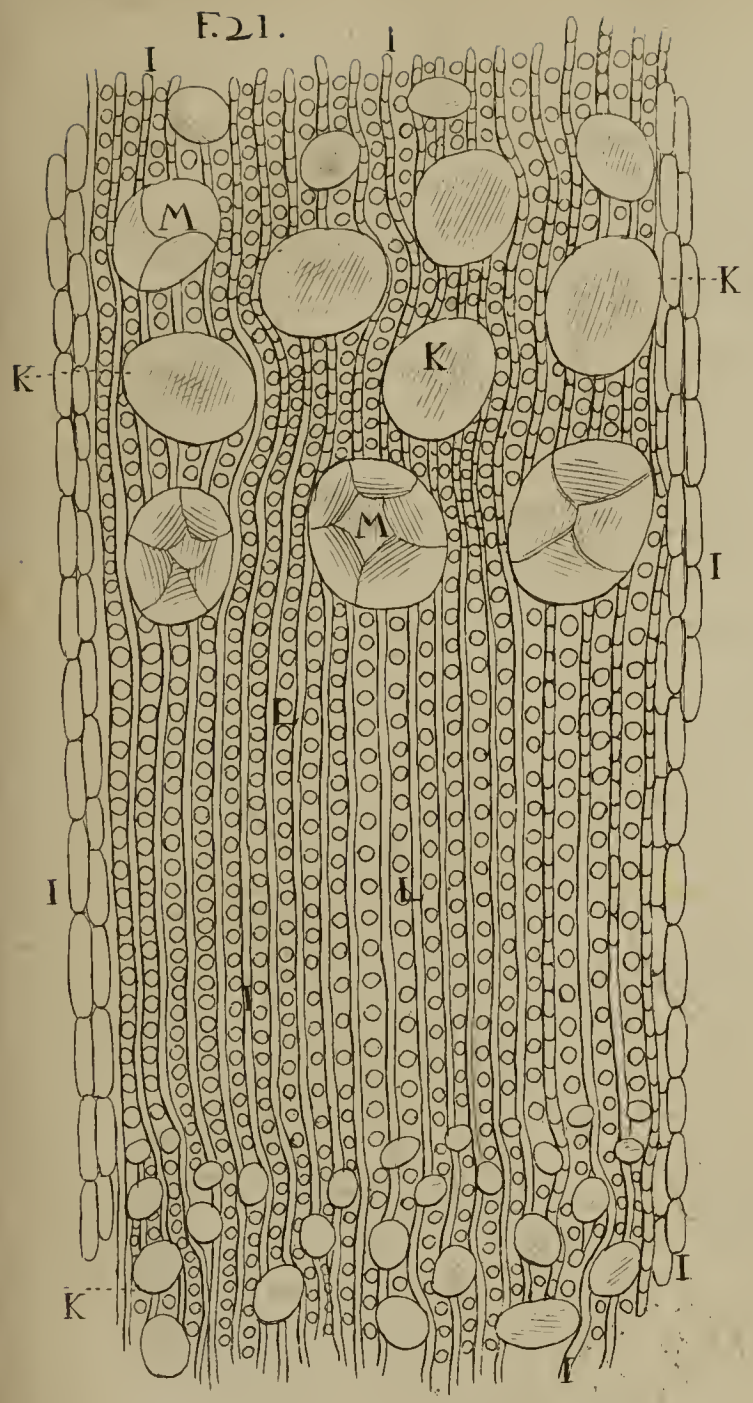
F.21.



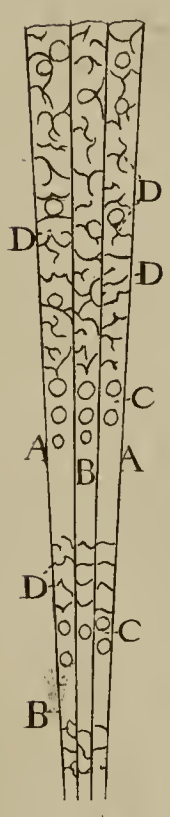




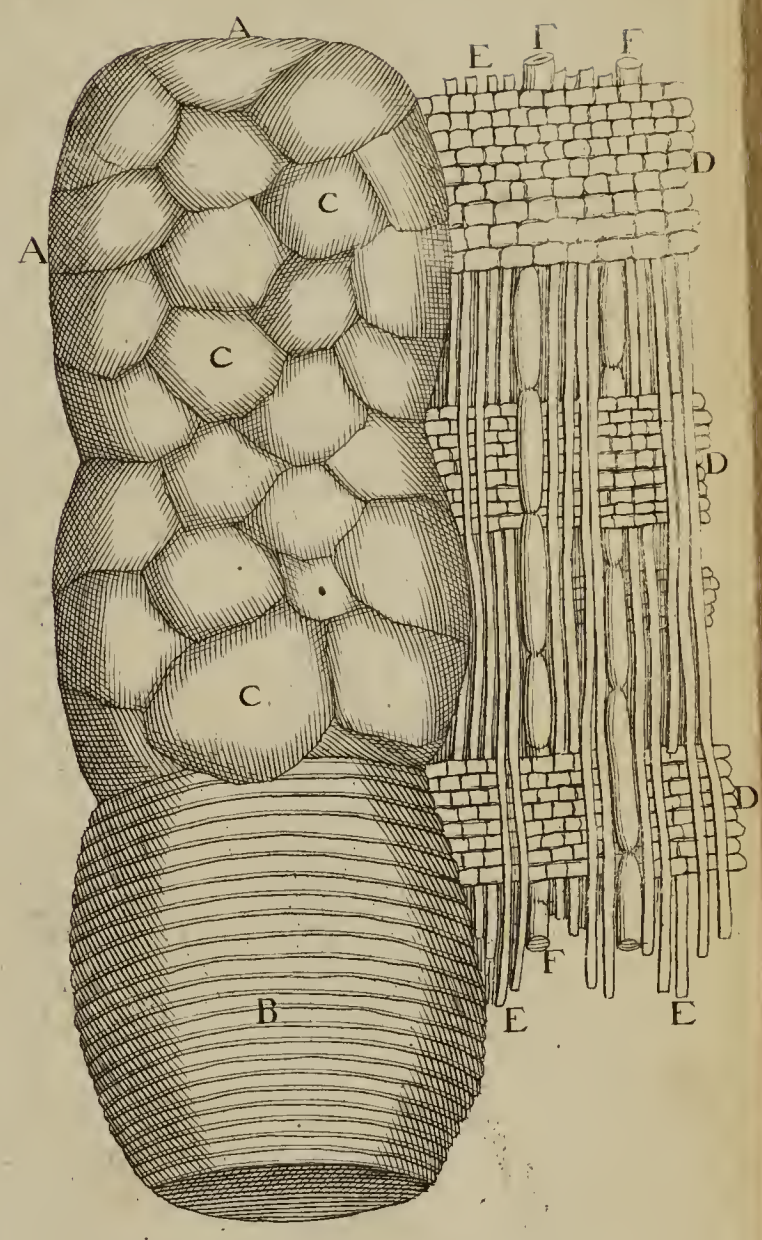
F.21.



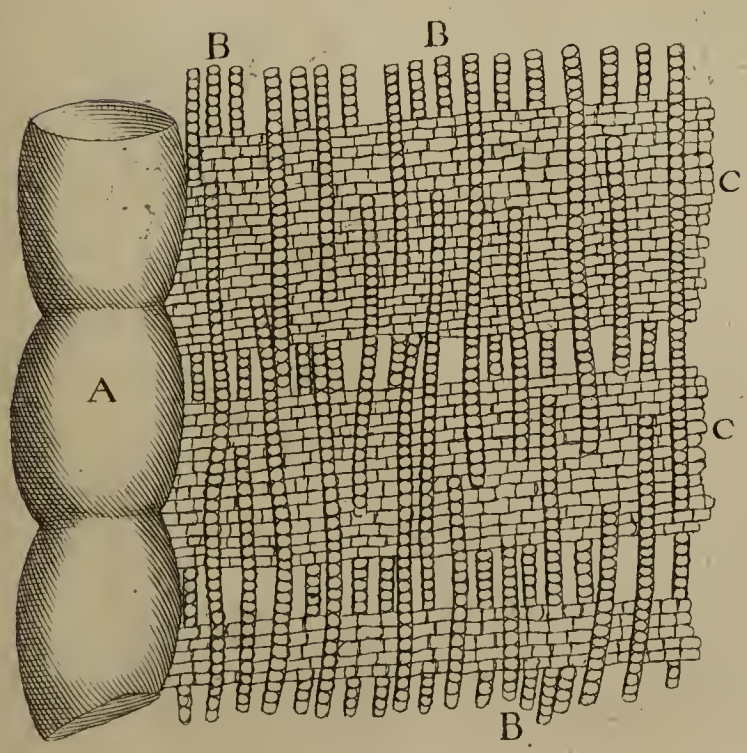
F.22.



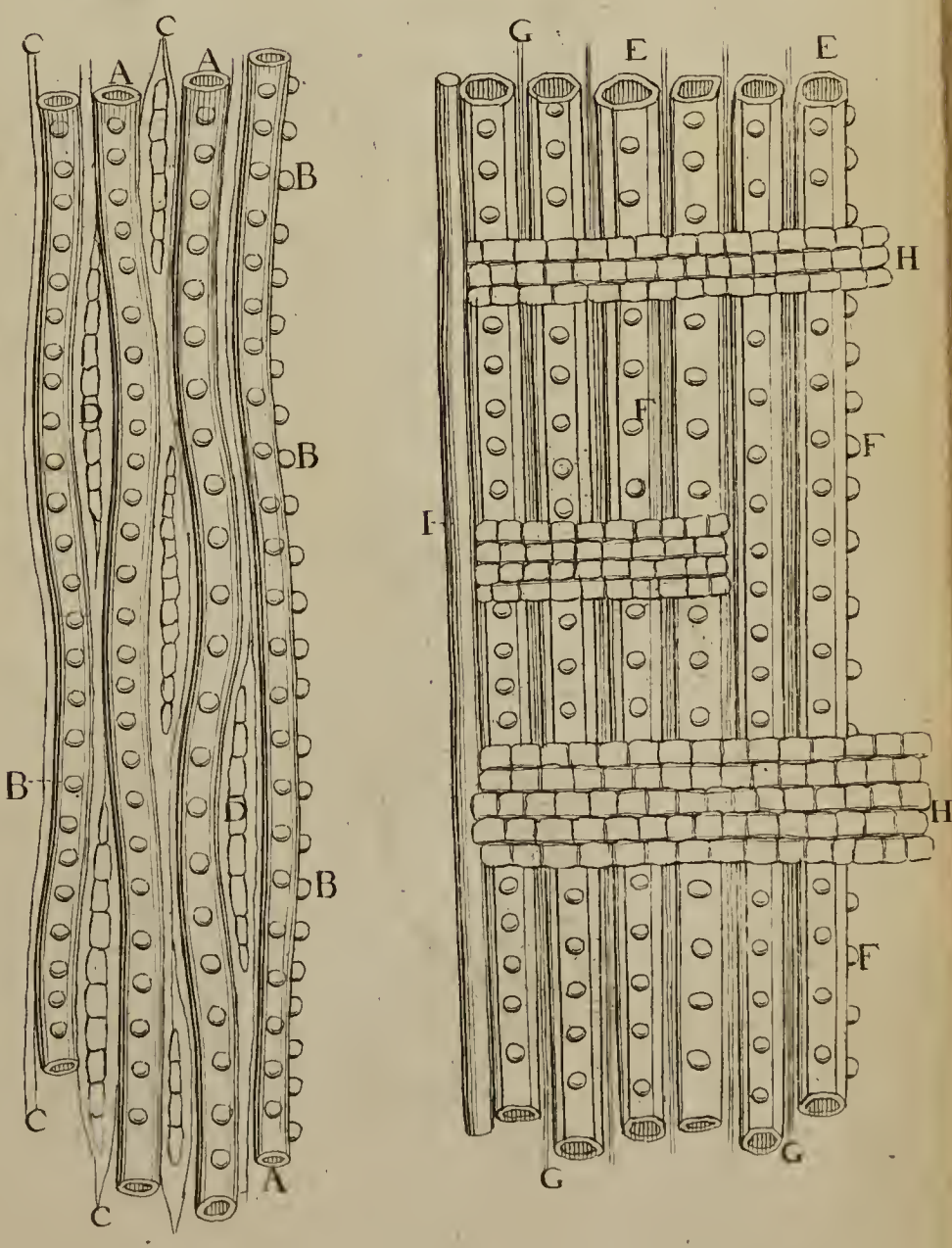
F.23.



F.24.



F.25.



buloſæ ſunt, orbiculis invicem hiantibus *E* contextæ, & tranſverſaliter ductos utriculorum ordines *F* ſuperequitando fortem contexturam excitant. Copioſi & ferè innumeri ſunt horizontalium utriculorum minores ordines *F*; reliqui verò *C*, qui inſignioribus conſtant utriculis, ſunt numero minores. Inter lignearum fiſtularum contexturam elongantur ſpirales fiſtulæ *G*, quarum aliquæ *H* inſigniores ſunt, reliquæ graciliores. Tubuloſa hæc corpora tenui laminâ de more excitantur, quæ argentei coloris eſt, & in ſpiram contorquetur; hæc eadem, quaſi piſcium corium, corpuſculorum ſquamatim contextorum ſpeciem exhibet. Trachearum & reliquorum ſitus, indagato ejuſdem ligni horizontali ſegmento, faciliùs patet: In hoc itaque copioſiſſimi excurrunt utriculorum minores faſciæ, ſeu ordines *I*, à cortice versùs medullam deducti, qui à recto declinant tramite, ubi trachearum turgentiâ flectuntur, & curvantur. Utriculorum tranſverſalium adauctam magnitudinem in extremo iconis addere placuit; oblongâ etenim conſtant formâ, ſibique invicem hiant; interdum urgentibus tracheis veluti iſthmo coerciti, ita detumeſcunt ut ferè oblitterentur. In oblongis areis, quæ inter enarratos ordines *I* intercipiuntur, trachearum ora aperiuntur: Iſtæ hinc inde ligneis fibris firmantur, & ambiuntur, quarum delineationem omiſimus. Inæqualem magnitudinem ſortita ſunt trachearum orificia; determinati namque ordines trachearum inſignium *K*, quaſi tot inæquales circuli ſeſe continentes, ligni ſegmentum complent; reliquum verò areæ ſpatium, inter hæc inſignia trachearum ora *K* contentum, minimis hiantibus tracheis *L* occupatur. Ampliores ſpirales fiſtulæ *K*, frequenter *pulmonares* quaſi *veſiculas M*, trachearum ſubſtantiâ excitatas, continent; hæ quandoque invicem hiant, interdum ovali conſtant formâ, & altero nonnunquam fine impervii ſunt, ita ut parum diſſimiles pulmonaribus veſiculis inſectorum extent.

In ramis *caſtaneæ*, & *quercûs* 22, quatuor vel quinque annorum, per tranſverſum ſectis, utriculorum horizontalium productiones *A*, versùs medullam elongatæ, emergunt; inter quas ligneę portiones *B* intercipiuntur, in quibus ampliora trachearum ora *C* ſub determinatis circulis aperiuntur. In ligneis portionibus ſeu areis *B*, appendices *D*, diverſam ſubſtantiam & colorem referentes, interſeruntur, quę continuatę cum tranſverſalibus utriculorum ordinibus *A*, quaſi pendentes utriculorum racemi non immerito cenſendę veniunt. Tab. 6.

Caſtaneæ truncus 23, & ejuſdem continuata lignea portio, conſimili gaudet partium compage. In ſecto per tranſverſum caudice, trachearum inſignium ora ſub iiſdem circulis locata, occurrunt; utriculorum pariter copioſę portiones à cortice in medullam deductę. Peramplæ ſunt trachearum fiſtulę, ut non facilè talem in reliquis lignis amplitudinem reperias; quare, ſecto ſecundùm longitudinem ligno, ingens trachearum ſatellitium ſeſe offert, quarum ampliores *A*, ſpirali excitatæ zonâ *B* interiùs, pulmonaris inſtar lobi, veſicularum *C* congeriem fovent: Reliquum ligni, tranſverſalium utriculorum ordinibus *D*, & ligneis fi-

ſtulis *E*, mutuò implicitis, completur, interpoſitis minimis tracheis *F*.

Ulmi, *ceraſi*, *mori*, & ſimilium, elegans pariter eſt ligni contextura, & fortè minùs obſcura, ob colorum varietatem, quę in tranſverſalibus utriculis luxuriat. Parem inſuper ſtructuram in *Indico ligno* 24, vulgò *campeggio*, animadvertimus, cujus exteriorem ſuperficiem fibrę excurrunt, & curvatę areas excitant, quę utriculorum diverſi coloris horizontalibus faſciis pervaduntur. Idem lignum perpendiculariter ſectum, & luſtratum, utplurimùm parum abſimilem ab exarato icone ſpeciem refert. Trachea *A* inſignis magnitudinis, ſi fibris comparetur, illico patet; hęc tubuloſa eſt, ſolitâque excitata zonâ argenteum refert colorem, & ſquamulis compaginari videtur. Succedunt ligneę fiſtulę *B* rubicundi coloris, quę & ipſæ ſubrotundis orbiculis componuntur, & obliquè ductæ, variè horizontales utriculorum ordines *C*, glutinoſo ſucco refertos, ſuperequitant.

Abietis & *Cupreſſûs* lignum, ob ſuarum particularum exiguitatem & luciditatem, difficillimę eſt indaginis; prout tamen ſubobſcurè mihi emerſit, hujus exhibeo iconiſmos. Sub cortice 25 occurrens lignum, fiſtulis *A*, quas probabiliter tracheas eſſe cenſeo, gracilibus componitur; hæ argenteis laminulis contextæ, à lateribus ſubrotundos emittunt tumores *B*. Hinc inde lignea portio *C* locatur, quę identidem curvata, angulares areas *D*, pro utriculis horizontalibus, deſignat. In ejuſdem interiori portione, perpendiculari inſtitutâ ligni ſectione ſecundùm tranſverſalium utriculorum progreſſum, eędem tracheę *E* pellucidę longitudinem excurrunt, & copioſos hinc inde promunt tumores *F*. Tam frequentes ſunt, ut tota ligni compages his ſolis componi videatur. Inter has, ligneæ fiſtulæ *G*, graciles tamen, interſeruntur; unde laceratione ſubobſcurè emergunt. Trachearum ordines tranſverſales utriculi *H*, oblongâ conſtantes figurâ, coloris ſubvitellini, ſuperequitando excurrunt, & cum ipſis implicantur. Statis pariter locis obſervantur vaſa *I*, quæ ſecundùm longitudinem producta totum irrigant lignum: Hujuſmodi terebinthinam fundunt, & tenui componuntur fiſtulâ. Singulorum minùs obſcuram reddit notitiam ſegmenti indago; nam in hoc exaratarum trachearum patula ſunt ora *K*, quæ irregulari pollent formâ, & pluribus angulis ſcatent, ita ut invicem ſeſe comprimant, & anguſtent. Inter ipſa mediant ligneæ fibræ minimę, & utriculorum ordines *L* horizontaliter ducti.

Jam *Caudicis* & *Caulis* in Vegetantibus, quæ facilè ad meas devenêre manus, inſignem thoracem, lignique compagem, prout inſtrumentorum meorum ruditas attingere potuit, rimatus ſum; nec improbabiliter enunciare licet, *Lignum* conſtare fibris ſeu fiſtulis, tracheis, utriculorum horizontalium ſeriebus, (quæ in aliquibus in medullam deſinunt,) & vaſe proprio: Et licèt in quibuſdam cauliculis Ligni ſoliditas & continuata contextura in cylindrum compaginata non emergat, diſparati tamen faſciculi, quaſi per medullam diſperſi, veram ligni ſapiunt naturam. Præcipua ut plurimùm, igitur & potior trunci cauliſque portio, ligneis fiſtulis excitatur:

tatur. Sunt autem hæ fiſtulæ ejuſdem naturę cum exaratis, corticem compingentibus; iiſdem enim componuntur minimis vacuiſque orbiculis, invicem hiantibus; & conſimilem admittunt ſuccum. His accedat, (ut infra patebit;) libri portionem, interiores *ſcil.* fibrarum corticis portiones, & involucra, antiquo ligno agglutinata, truncum augere, ita ut non rarò oblongam & continuatam fibram, mox in lignum ferruminatam, paulò infrà, corticis naturam adhuc ſervantem, animadverterim; unde nil mirum, ſi in truncis & ramis arborum, quibus corticis exigua portio detracta eſt,, ſubjecta lignea pars cortice deſtituta nunquam augmentum capiat, ſed ſubcreſcentibus, velut in ulceribus & vulneribus, circumcirca ligneis labiis, ex ſuperſtite jam cortice, ſenſim in lignum agglutinato, profunda ſubſit cavitas: Ex quo conjectari pariter licet, inter exaratas ligneas fibras *anaſtomoſim* intercedere, ita ut delatus ſuccus in laterales & proximas derivari poſſit; cùm enim certò hujuſmodi fiſtulæ, recta ſurſum productæ, in dicta corticis inciſione lacerentur, & evidens cum ſuperioribus tollatur continuitas, cum adhuc ſuccedat augmentum, vitaque perennet, neceſſariò fatendum eſt, in contiguas & laterales exonerari inferiores fibras, illaſque detruncatis tandem ſuperioribus fibris ſuccum reddere. Nec novum eſt, ligni augmentum lateraliter etiam ſuccedere, quotieſcunque ingens etiam concavitas in caudice occurrit, vel inane ſpatium excitatur; cùm detruncatis ramis, turgente caudicis ſucco, exteriores & ſubcreſcentes ligni particulę, per modum involucri ſucceſſivè obductę, adeò lateraliter creſcant, ut cicatricem jam detruncati rami cooperiant, & extrà tumores ſeu toros, quaſi nodos, excitent. In hoc itaque excitando mirę fiunt fibrarum & reliquorum vaſorum contorſiones & revolutiones labyrintheę, ut Naturę luſus videatur. Taliter ductæ ligneæ fibræ ſucco replentur, qui ex Naturæ legibus ſurſum pellitur; non tamen interiùs valvulæ ex toto occludentes locantur, cùm ſurculis & grandioribus etiam ramis, apice inferiùs humato & plantato, alimenti terminus invertatur, novæque gemmæ mutatâ directione erumpant; ut præ cæteris patet in *ficu*, & *rubo*. Hoc tamen perpetuò evenit, plantatos taliter hujuſmodi ſurculos minùs provectiores fieri.

Ligneas fiſtulas truncum componere, & tranſverſalium utriculorum ſeriebus implicari vidimus, unde ligni robur & alimenti coctio in diſpoſitis officinis perficitur. Utriculorum igitur ordines ovalibus invicem hiantibus corporibus compaginantur, unde & contento ſucco turgent, & diverſo inficiuntur colore.

Ampliores fiunt utriculi & tumidiores, & fortaſſe etiam ipſorum ordines multiplicantur in reciſo trunco, ſuperſtite adhuc radice, modicoque caudicis; hoc præ cæteris in *quercu* & *robore* 26 experimur, cujus ve- Tab. 7.
getantis adhuc caudicis fruſtulum talem exhibet ſpeciem: Surſum elongati fibrarum faſciculi *A* diverſas areas efformant, quarum conſuetam ſervant magnitudinem *B*, reliquæ verò, variè turgentibus utriculis *C*, laxatæ in ingentem extenduntur latitudinem, ita ut monſtroſam ferè acquirant formam. Singulorum utriculorum licèt non una ſit forma, frequentiùs

quentiùs tamen ad ovalem accedunt, & urgente fibrarum texturâ non rarò comprimuntur. Tenui probabiliter excitantur membranâ, quæ soliditatem tractu temporis concipit affuso succo, quo tabe consumpto, laxa molliſque supereſt pellicula. In iiſdem etiam conſumptis lignis vaſcula, utriculos ipſos reticulariter ambientia, occurrunt; unde conjectari licet, vaſorum plexibus tranſverſalium ſacculorum ordines irrigari; & in medullæ utriculis *ſambuci*, *ebuli*, & ſimilium, multiplex vaſculorum plexus luxuriat, quo ſinguli ambiuntur. Enaſcuntur probabiliter à rectis ligneis fibris tum corticis, tum ligni; nam in utriſque utriculorum ordinibus unam eandemque naturam reperiri dubitavimus. In quibuſdam Caulibus (ut diverſis indicavimus iconiſmis,) lignea diſpergitur portio, in peculiares recollecta faſciculos; & hinc inde pendent utriculorum ordines: In Arborum verò truncis lignea portio, continuatâ à cortice in medullam implicatione, radioſas excitat partes, quę hinc inde ab appenſis & productis utriculorum ſeriebus ambitur. Et ſicut in Caulibus, utriculorum ordines, ex ſitu & continuitate à fibris enaſci probabiliter evicimus, ita in truncis non incongruè enunciare poſſumus. Non idem eſt utriculorum ſitus in arborum caudice, ac ſit in reliquis plantarum caulibus; in illo enim cum ligneis fibris, à quibus exoriuntur, horizontaliter ducti, angulum rectum efformant, & elegantem implicationem cum contiguis fibris ſortitæ, rectam ferè horizontalem lineam deſignant; quod in caulibus non ita contingit, cùm hucuſque diverſimodè locari viderim. Utriculorum exortum *gallarum* indago, (aliàs exponenda,) indicare videtur, in qua prę cæteris à ligneis fibris pendent & emanant copioſæ utriculorum ovalium appendices, quibus *gallæ* corpus conglobatur; foliorum pariter, florumque ſtructura, & pericarpium ipſum, (ſuis locis illuſtranda) ulteriùs confirmant.

Tranſverſales utriculorum ordines, à ligneis fiſtulis pendentes, in faſciculos & faſcias recolliguntur, quas in *quercu* inſignes mirati ſumus. In Fruticibus, & in quibus non valde craſſum eſt ligneum corpus, & condita medulla ampla eſt, à cortice, utriculorum appendices in medullam deducuntur, & in ipſam laxantur: In grandioribus tamen truncis, & Arborum ramis, non quælibet utriculorum faſcia à cortice deducta medullam attingit, ſed nonnulla circa medium obliteratur, novis ſubortis in penitioribus ligni circulis. Quare rationi conſonum videtur, à ligneis fibris frequentiſſimas promi hujuſmodi appendices, ſeu ab ipſis pendere exaratas utriculorum ſtirias, quæ contiguis unitæ, & horizontaliter ſituatæ, inæqualis longitudinis faſciculos ceu congeriem efformant, quorum tanta eſt quantitas, & magnitudo, ut ferè æquent reliquorum vaſorum numerum & magnitudinem. Tranſverſales utriculorum ordines, à cortice emanantes, per ligneas fibras producti interiùs in medullam exonerantur, unde eadem natura in utriſque reperitur; quandoque cortex, cùm ſit veluti ligneus infans, cujus partes nondum adoleverunt, nec firmatæ ſubſiſtunt, ſuæ auctionis materiam in pendentibus utriculorum ſeriebus fovet & ſervat; medulla verò in tenellis & paucorum menſium ſurculis, quaſi interior

terior cortex luxuriat, non adauctis adhuc tenellis ligneis fibris, quarum incremento ferè contabescit; unde in infantibus tantum surculis perpetuò reperitur; quin & eadem phœnomena, quæ in corticis utriculis contingunt, quandoque in medulla occurrunt.

In ramo *populi* vetustissimæ, cujus surculi & minores rami brevissimi sunt, institutâ per transversum sectione, cortex crassus occurrit 27, innumeras tartareas tesseras *A* inter minores utriculos continens; interiùs detruncati fibrarum lignearum excurrunt ordines *B*, sub quibus utriculorum minimorum zona *C* extenditur, quæ ligneum cylindrum ambit, cum hac tamen ratione, ut geminis in locis *D*, laxatâ ligni compage, corticis utriculorum ordines *E* cum medulla continuentur, in qua non tantum utriculorum eadem species adest, sed & tartarea corpora *F* copiosè recolliguntur.

In *ferulaceis* & *fruticibus* quibusdam brevioris vitæ, copiosa extat medulla; fortasse ut in liberiori loco multiplex humor excoquatur, & faciliùs expiret, & sicuti citò crescunt, citò pariter pereunt; aqueus enim nutritivus humor, medullâ contentus, non talem præbet soliditatem, qualem reliquis arboribus transversales utriculorum ordines impertiuntur. Quare probabiliter conjectari possumus, plantarum hujusmodi medullas, transversales esse utriculorum ordines, hinc inde à dispersis fibrarum fasciculis pendentes, nec fibrarum lignearum implicatione firmari, velut reliquis ligneis arborum contexturis accidit.

Medullæ usûs olim insignis, cordi & cerebro analogus credebatur; transversales autem ordines, unâ cum medulla, conspicuo & communi usui inservire necesse est. Probabile igitur est, succum, qui per fibras ligneas sursum fertur, per caulem & caudicem, appensosque ramos, in utriculorum laterales & continuatas appendices sensim exonerari, ibique diuturniori intercedente morâ in nutritivum succum evehi. Et, *sicut* in animalibus perfectis nova alimonia sub chyli specie venas subintrat, ubi antiquo sanguini, pluribus ditato fermentis, (lymphâ *scil.* et aliis,) commixtus perenni *circulationis* motu rotatus, totius corporis habitus, peculiares *scil.* carnium, viscerum, & interstitiorum officinas, subintrat, à quibus recollecta, sensim determinata fermenta recipit, ut, horum ope ad debitam evectus naturam, succedente transpiratu & excrementorum præcipitatione, animalis munia subire possit; *Ita* in plantis delatus à ligneis fistulis crudus adhuc succus illico affunditur antiquo & jam perennanti in utriculis succo, & longiori morâ in naturam quasi fermenti exaltatur. Hic igitur conquiescens humor proportionales fermentorum miscelas recipit, quas in animalibus sanguis in circulatione visceribus & ambitu perquirit. Concoquitur itaque in horizontalibus utriculis & medullâ ipsâ succus, & in ipsis recollectus asservatur, ut futuris & proximè erupturis gemmis, & tenellis foliis præsto sit. Hinc fortasse bulbus, cæpe, & similia, crassiorem sub terra condunt quasi truncum, transversalibus utriculis turgidum, ut excoctus humor non solùm futurorum foliorum materia extet, sed, veluti fermentum, de novo adveniens, alimentum concoquat & digerat. Quare eâdem de

cauſa forſan continget, ſurculum, exiguæ licèt molis, inſigni alterius naturæ trunco inoculatum & inſitione unitum, fructus promere diverſos à natura ſubjecti trunci, qui primò alimentum ſuppeditat: Tota enim variatio non in ſolam fiſtularum formam, peculiarem admittentem ſuccum, longéque diverſum à cribrato per ſubjectas caudicis fibras humore, refundi debet; ſed in naturam ſucci, in tranſverſalibus utriculis contenti, qui quantò potentior eſt, tantò fortiùs coctionem perficit.

Inter vaſa, plantarum thoracem replentia, inſignes fiſtulas perpetuò patulas reperiri, inductione collegimus; has *ſpirales*, à compoſitione, placuit interdum vocitare, veriùs tamen *tracheas* ab officio. Multis ab hinc annis mihi innotuêre in ſingulis arborum truncis, cauliculis, foliis, floribus, reliquiſque partibus, quibus vegetantia integrantur, ut ſignatim patebit. In lignea portione, ut indicavimus, magis & minus copioſæ luxuriant, talemque nanciſcuntur ſitum, ut perpetuò lignearum fibrarum faſciculo, veluti vaginâ, ambiantur, & in cauliculis quarundam plantarum, trachearum collectiones ligneis fibris ita ingeniosè aſſociantur, ut Naturæ myſterium neceſſariò ſubſit.

Cinaræ 28 caulis mirè componitur; varii enim fibrarum faſciculi compaginantur: Interdum triplex fiſtularum lignearum collectio *A* geminos trachearum ordines *B* intercipit & ambit; quandoque gemini trachearum faſciculi *A* unicum fibrarum acervum *B* amplexantur, & urgent.

Trachearum compoſitionem ſuperiùs innuimus; argentea namque lamina in ſpiram contorta fiſtulam perpetuò patentem excitat, & ſquamatim contexta, tubos & veſiculas, perſimiles inſectorum pulmonibus, variè componit. Et *ſicut* in nobis reliquiſque ſanguineis perfectioribus trachea cartilagineis annulis componitur, qui interpoſitis muſculis & membranoſis nexibus continuantur; ubi verò illa in pulmones laxatur, annulorum continuitas tollitur, & diverſæ excitantur laminæ, taliterque contextæ locantur, ut ſeſe invicem ſquamatim ſubingredi, connivere, & ad tempus exeri poſſint; *ita* in plantis & inſectis, loco annulorum, ſpiralem laminam Natura fabrefecit, quæ ſquamoſis fruſtulis compacta, conſtrictionem & dilatationem in vehementibus flexuris & curvationibus arborum, & in elaſtico concluſi aeris motu, pati poteſt. Taliter excitatæ plantarum tracheæ, non multùm à recto declinantes, à radicibus ſurſum in truncum, caulem & ramos diſperguntur; in foliis verò curvatæ, in rete implicantur.

Interdum in caudicibus quibuſdam non longè à radicibus, ut in *moro* 29 frequenter deprehendi, eminentię quædam ligneæ protuberant, quæ vaginæ inſtar tracheas cuſtodiunt, quarum varius eſt progreſſus; unus quandoque exteriùs videtur truncus *A*, qui in plures fiſtulas *B* ſolvitur; non rarò per tranſverſum ducuntur tracheæ *C*; & ubi ex erumpentibus præcipuè ramis amplæ contingunt areæ, vel ſpatia, hujuſmodi tracheæ contorquentur in ſpiram *D*: Et tamen mirabile eſt non perpetuò eandem inclinationem & circumvolutionem pati ligneas *E* fibras, ſed interdum

dum ſurſum ferri, aberrantibus multùm à recta linea contentis tracheis *F.*

Tanta eſt *Reſpirationis* neceſſitas, & uſus, ut Natura in ſingulis viventium ordinibus varia, ſed analoga, paraverit inſtrumenta, quæ *pulmones* vocamus, cum hoc diſcrimine, ut quæ perfectiora nobis cenſentur, ea minori pulmonum apparatu gaudeant. Ita homini, reliquiſque quadrupedibus, quæ perfecta dicuntur, geminos elargitur pulmones, per quos perpetuò totus ſanguis pertranſit; in avibus verò, abdominis cavitas in additamentum pulmonibus additur. In piſcibus pariter operoſa eſt Natura; nam frequenter branchias ſub multiplici ordine molitur, & polypo reliquiſque conſimilibus geminos pulmones quaſi moſcum ab abdomine pendere jubet; quibus omnibus reſpiratio ex aqua promovetur. Nec teſtaceis & cruſtaceis deſunt pulmones, ſed frequenter propriâ mole reliquum corporis ſuperant. Viliora pariter inſecta ſuo muniuntur pulmone, qui tantam dimenſionem ſortitur, ut reliquarum partium molem longè excedat; ita in *papilionibus* olim decem & octo deprehendi pulmones, qui non ut in nobis, reliquiſque animantibus, debitè circumſcripti propriâ coercentur cavitate, ſed oblongas promentes tracheas, quæ modò in vaſa coarctantur, modò in veſicas pulmonares laxantur, in ſingulas corporis partes, vaſorum ritu, propagantur, & ramificantur. In *plantis* verò, quæ infimum animalium attingunt ordinem, tantam trachearum copiam & productionem extare par eſt, ut his minimæ vegetantium partes præter corticem irrigentur.

Exarati *pulmones* in ſingulis viventium ordinibus, à variis continentibus & ambientibus liquidis, quibus immerguntur, peculiarem hauriunt icorem, vitæ neceſſarium. Hunc ambiens aer nobis, reliquiſque terreſtribus perfectis, & inſectis ipſis præſtat: Piſces, cruſtacea, reliquáque aquatilia, reſpirationis materiam ab aqua ſeparant; plantæ igitur (ut conjectari fas eſt) cum ſint viventia, viſceribus infixa terræ, ab hac, ſeu potius ab aqua & aëre, commixtis & percolatis à terra, reſpirationis ſuę materiam recipiunt, ipſarumque tracheæ ab halitu terræ, extremas radices ſubingreſſo, replentur. Diu anxiè quæſivi, an in foliis & cortice orificia pro aere paterent, nec ea unquam deprehendere potui; radices verò tantis coagmentantur trachęis, ut in quibuſdam plantis & arboribus hæ reliquarum molem longè ſuperent. Quare (ut dubitare licet) vapor ſeu reſpiratorius ſuccus à terra, aeri & aquæ mixta, ſeparatus, tracheas ſubintrans, ipſas replet & diſtendit: Et ſicut in nobis & conſimilibus, ſanguinis maſſa pulmones petit, ut ab ipſis ſeparatas aeris particulas recipiat, quod in aqua piſcium pulmones præſtant; & in inſectis non tota ſanguinis moles in pulmones confluit, ſed inversâ viâ pulmones ipſi, vaſorum ritu, in univerſum corpus diſperguntur, ſic ut ſingulæ partes aeris particulas per pulmones, & ſanguinis portiones per arterias recipiant; ita in plantarum pulmonibus vereri poſſumus, ne *vel* à tracheis minimi promantur ramuli in contiguas ligni partes, ut inſectis accidit; *vel* (probabiliùs) ligneæ fibræ, aut horizontalium utriculorum ordines, ſeparatam à trachearum tunicis halitûs partem, ſeu ſuccum, pro reſpiratione recipiant, cùm ligneæ fibræ, hederę inſtar, tracheas ambiant.

Reſpi-

Reſpirationis uſus licèt tantam nobis importet neceſſitatem, adeò tamen obſcurus, mihique adhuc ignotus eſt, ut poſt multas meditationes ea tantùm mihi repetere liceat, quæ aliàs ſubindicavi. Cùm enim vegetantium ſucci fermentationem & fluiditatem ſubire debeant, (aliàs nulla ſuccederet nutritio, & auctio,) ideò trachearum ope turbativum & ſummè activum ſeparatur, quo & fluiditas promovetur, & fermentatio excitatur; diverſæ namque ſalinæ particulæ, quæ præcipuè in plantarum vaſis abundant, facilè concretionem ſubirent, niſi inteſtino agitatæ motu perpetuò diſſociarentur, ut animalium liquoribus, & ſanguini accidit, cui pulmonum ope turbativus affunditur ſuccus, unde fluiditas, & fermentationis occaſio. In nobis & perfectis animalibus non parum aeris ingurgitatur, quo & ventriculus & continuata inteſtina tument; hunc autem cibariis, coctionem ſubeuntibus, intimè miſceri probabile eſt, proprioſque ſales & præcipuè nitrum per deliquium ſeparatos affundere, non ſolius cibariorum ſolutionis gratiâ, ſed etiam ut debita communicetur fluiditas. Quare fortaſſe in arborum plantatione altæ excitantur per longum ante tempus foveæ, ut ambientes terræ partes præcipitatis ab aere ſalibus imprægnentur, & affuſa tandem iterum aqua, multo immixta aeri, tenellis plantatæ arboris radiculis debitos ſubminiſtret ſales. In hunc etiam finem circa radices arte parantur vacuitates pro continendo aere. Idem etiam contingit in terrarum cultura; eatenus enim proficua eſt aratio, non tantùm, ut faciliùs ſales, liberiores redditi pertranſeunti aquæ, ſolvantur, ſed ut faciliùs & copioſiùs imprægnetur terra præcipitatis à contiguo aere nitro, & reliquis ſalibus, quibus vegetatio promoveri poteſt.

Dum potiores uſus aliorum ſagacitas detegit, curſim ſubnectam ego, contentum in tracheis aerem neceſſariò eaſdem pati proportionaliter alterationes, quas extra ſubit. Ita videmus liquidum humorem, quo ligneæ fibræ & tranſverſales utriculi replentur, urgente frigore glaciem concipere, & vehementi illâ rarefactione diſrumpere fibrarum compagem, & robuſtiſſimas etiam arbores, oblongis excitatis hiatibus, dilaniare & lacerare: Rarefactionem itaque & condenſationem incluſus aer experitur, variatâ *ſcil.* aeris temperie non ex ſola tempeſtatum mutatione, ſed ex ſucceſſivis diei & noctis immutatis craſibus. Et ſicut in nobis, reliquiſque ſanguineis analogis, reſpirationis motus, dilatio *ſcil.* & conſtrictio, interpolatis impulſibus promovet chyli & aliorum ſuccorum motum per lactea & conſimilia vaſa; ita ex trachearum dilatatione, intus turgente aere, neceſſariò urgentur interceptæ ligneæ fibræ, & horizontales utriculorum appendices, & ita probabiliter fit contenti ſucci expreſſio in contiguas partes; remittente verò tumore, laxiores redditi utriculi, & fiſtulæ ligneæ, faciliùs novum admittunt humorem; unde etiam in lignis ipſis, igni appoſitis, exeuntem copioſè humorem ab extremis fiſtularum orificiis paſſim videmus.

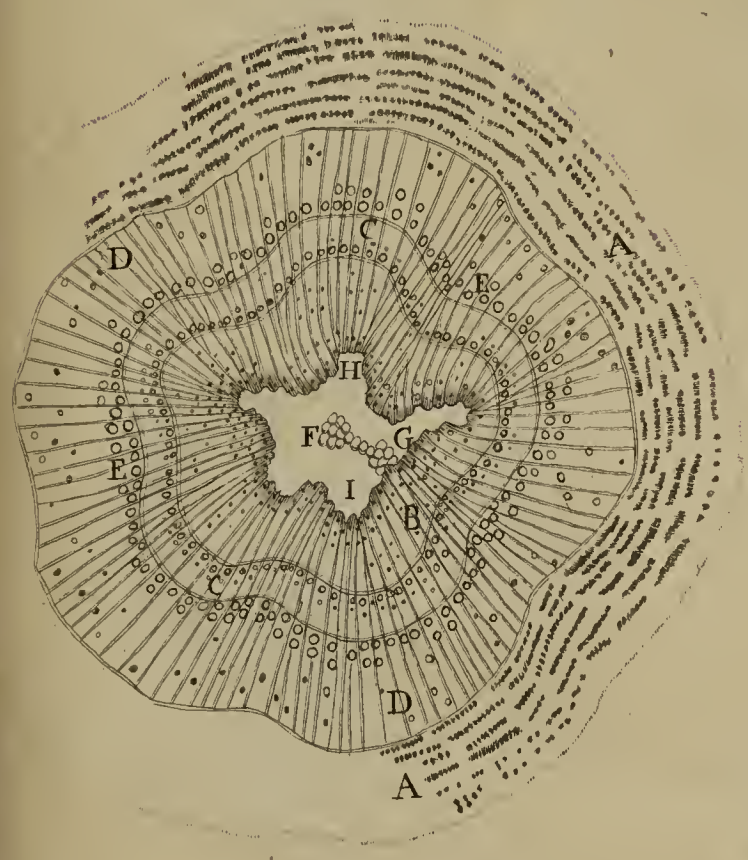
In herbarum arborumque compage, ultra tracheas & fiſtulas, peculiare vaſculum interdum deprehendi diximus, terebinthinâ, gummi, quandoque concreto & proprio refertum ſucco, & humore. Hujus indago feTAB. 7. liciter ſuccedit in *ebulo* 30; cujus ſegmentum, ultra lignearum fiſtularum coro-

F.32

F.33

F.34

F.35



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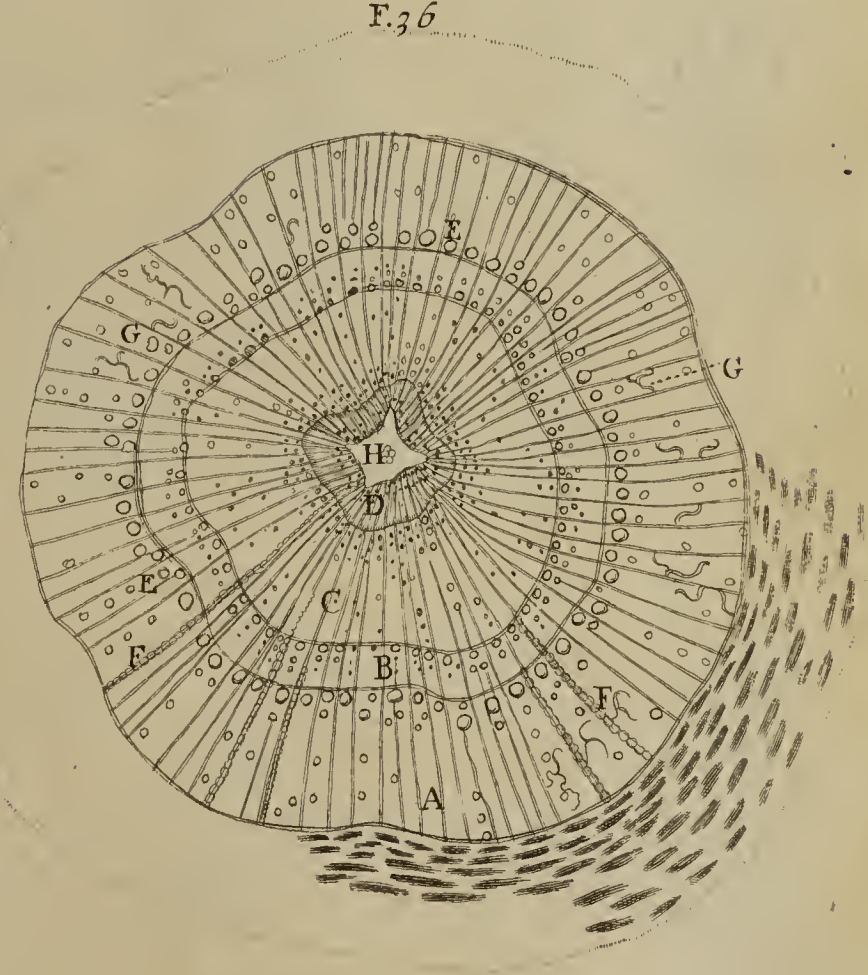

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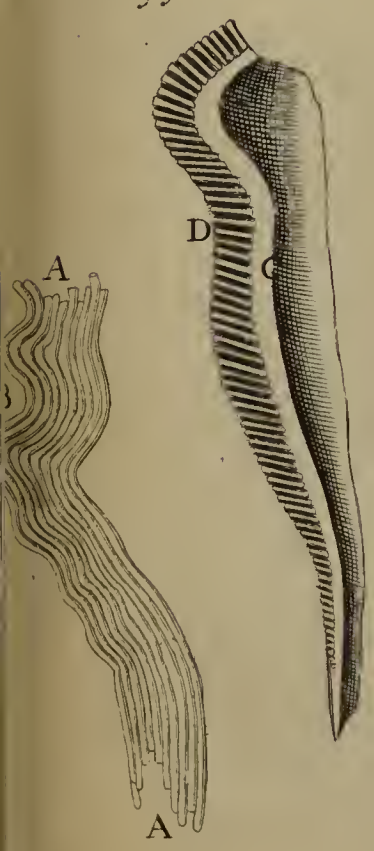

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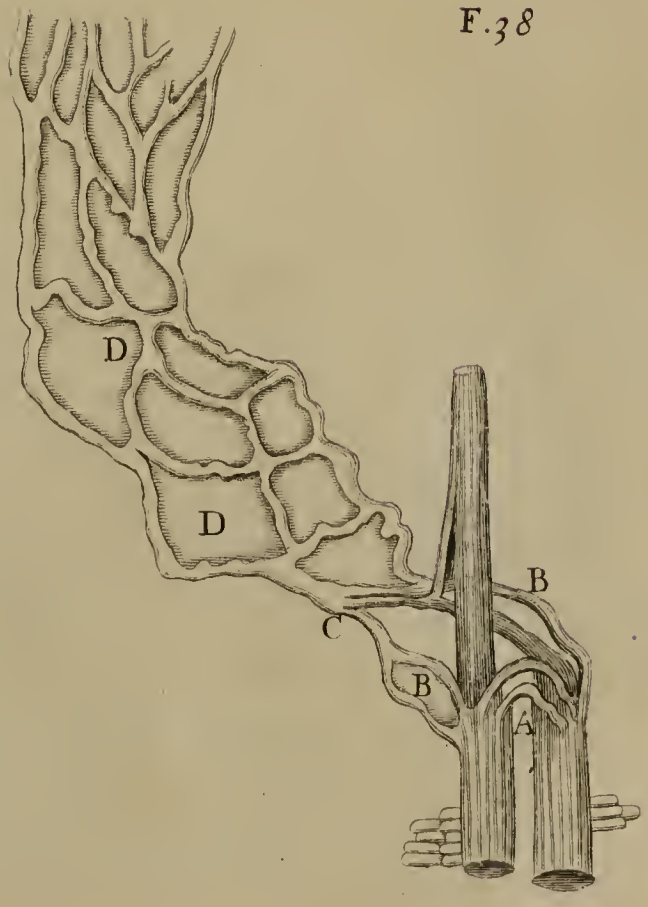

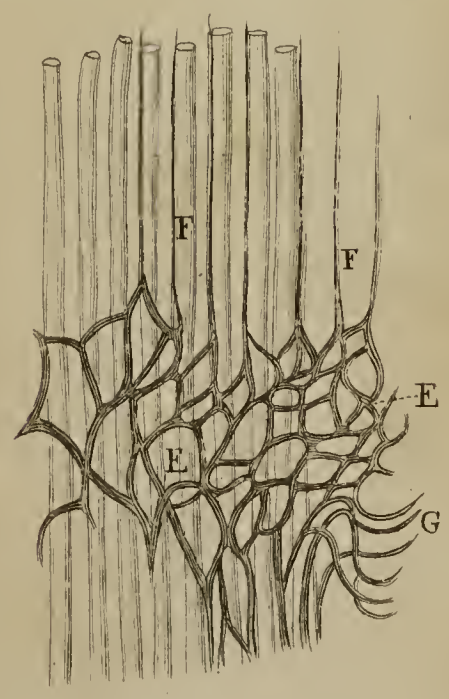

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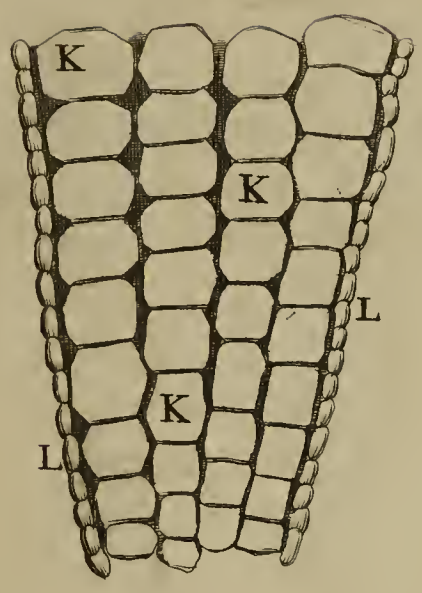
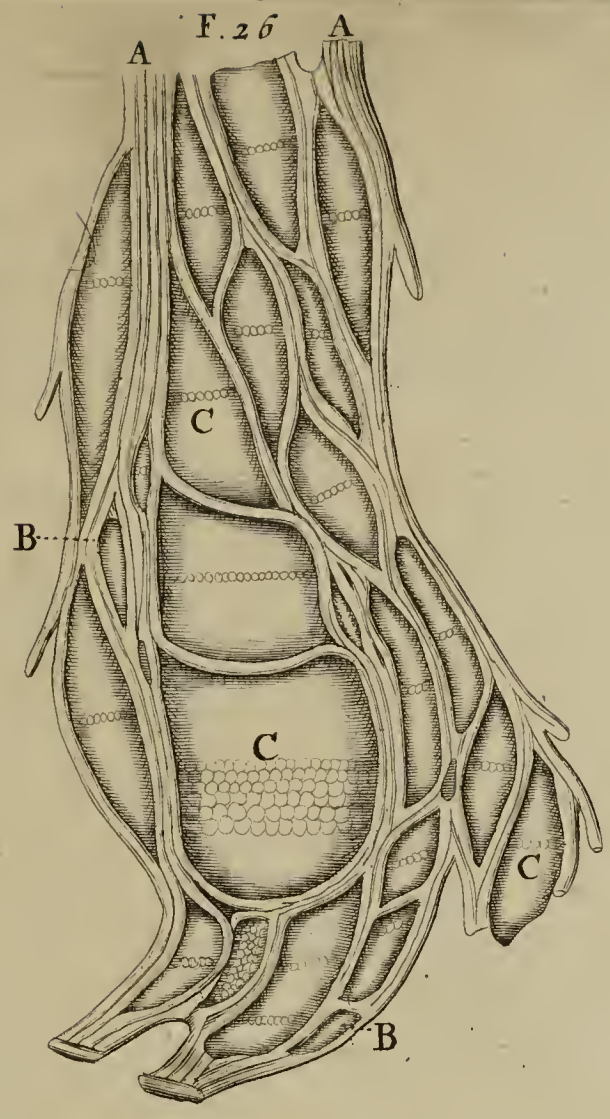
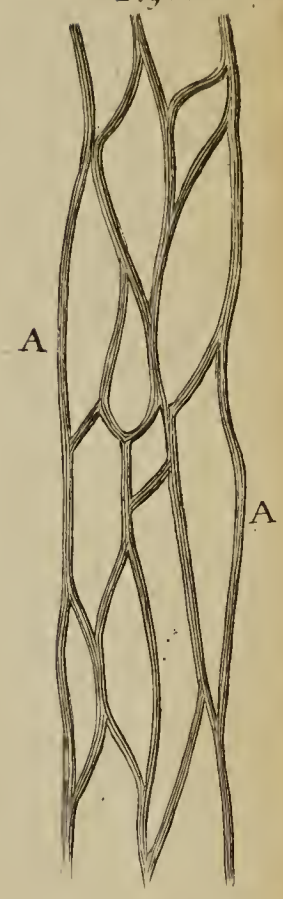


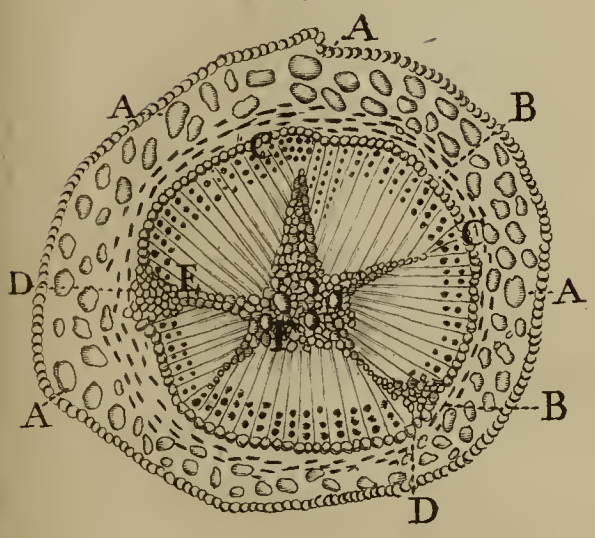
F. 26



F. 31. TAB



F. 27



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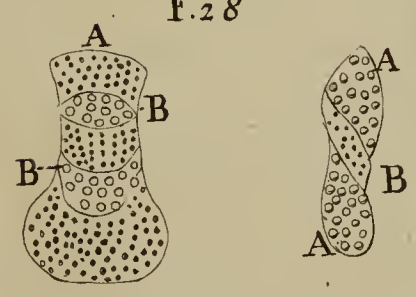

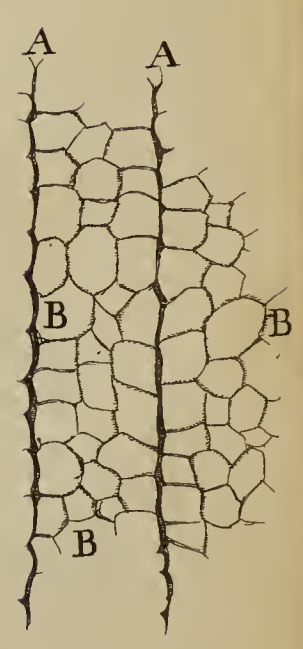

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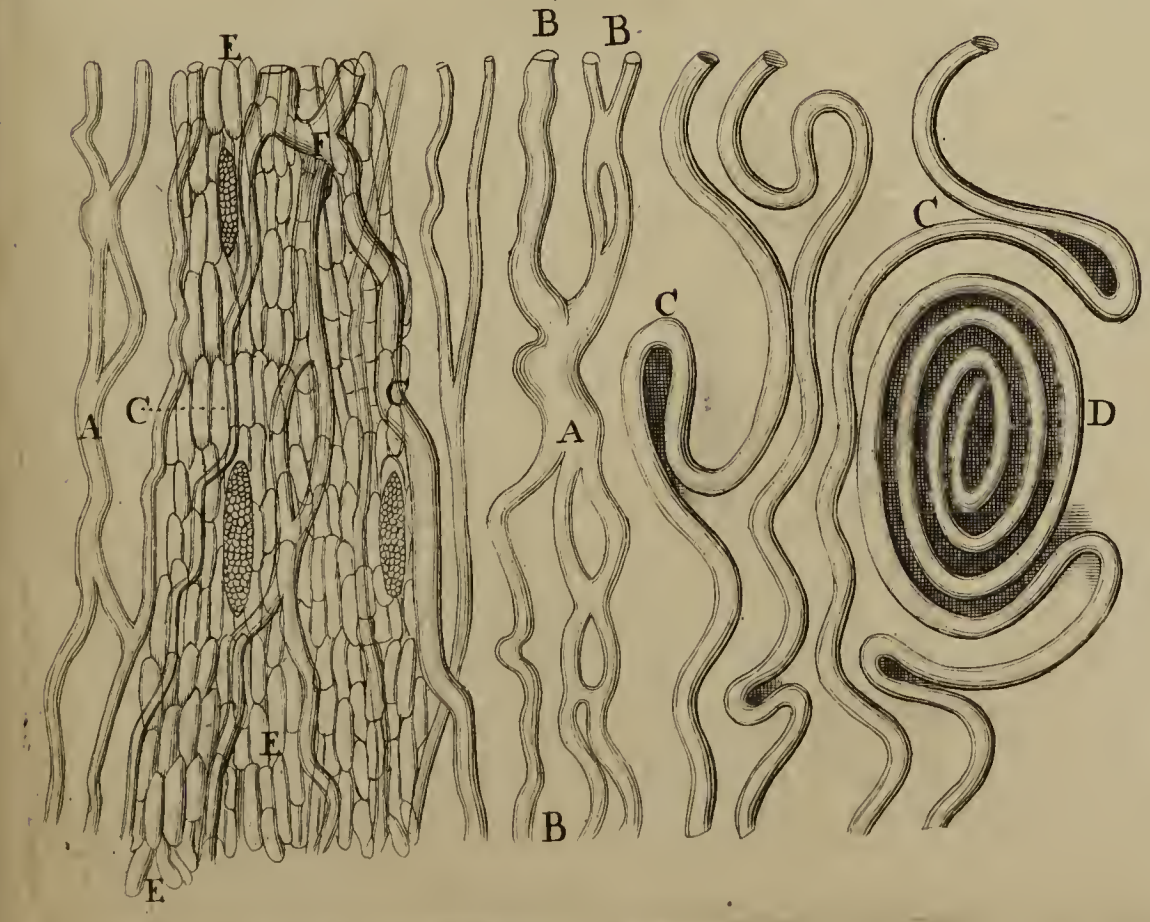
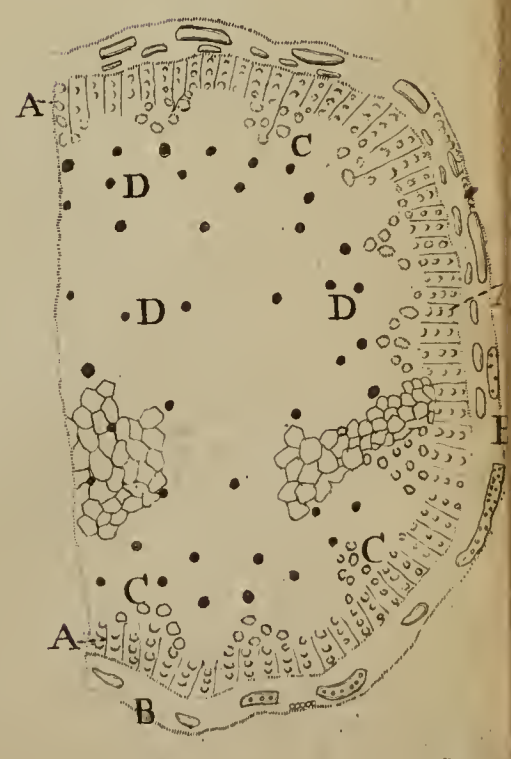


F. 30



coronam *A*, exteriorem caulis partem conſtituentem à cortice *B* circumdatam, cui lignei pariter faſciculi *C* adnectuntur, per medullam peculiaria vaſcula *D* diſſeminata exhibet; hæc autumno & hyeme concreto mellei coloris ſucco ſcatent.

Vaſorum hujuſmodi progreſſum in plantis illis, quibus ſuccus, omiſsâ diaphaneitate, vario inficitur colore, mirari tantùm licet. In *cinaræ* itaque lignea portione 31 non longè à medulla per longum vaſcula hæc *A* mutuam anaſtomoſim paſſa exporriguntur, & ſanguineo ferè turgida ſucco patent.

In *apio ruſtico* vaſcula hæc per longum *A* excurrunt, quæ hinc inde ſurculos promunt circa utriculorum peripheriam ramificatos, ſibique mutuò inoſculatos *B*. In ſingulis lactiferis, reſinamque fundentibus, laceratione occurrunt hujuſmodi vaſcula; in reliquis verò plantis, ubi contentus humor fuſco non inficitur colore, vel inſigniter concreſcendo ſoliditatem non acquirit, ob exiguitatem obſcurantur, minimúmque ſui veſtigium exhibent. Ex perpetuis tamen Naturæ legibus, quæ eandem vel ſaltem analogam ſervat in ſuis operibus methodum, videtur valde probabile, in ſingulis plantis peculiare vas adeſſe, ultimum & ſpecificum deferens alimentum. Contentus ſuccus, (ut ex nobis notis probabiliter philoſophemur,) cùm ſubſtantiæ modum & proprietates longè perfectiores habere videatur, ac in ſucco fiſtulis contento deprehenditur, ultimæ alimoniæ dotes & qualitates habebit. Ita in *abiete* & ſimil. elaboratior videtur terebinthinæ ſuccus, ac reliquus fibras occupans: Nec ſtructuræ ratio reclamat; cùm enim fibræ humorem in tranſverſales ordines exonerent, ut ſingulis partibus communicetur, non aliud promptius occurrit pro exequendo hoc munere, præter exaratum vas, ſuo turgidum humore, cùm præcipuè ramificationes circa utriculos habeat, ut totam plantarum peripheriam pervadat.

Succi hujus varia eſt natura; frequenter aquei diaphanique humoris ſpecie effluit, quandoque lactis inſtar, non rarò luteo inficitur colore, & interdum ſemiconcretus lentorem acquirit, ita ut, quot plantarum ſpecies extant, totidem peculiares ſucci inveniantur; ni dubitare velimus, quodcunque individuum vegetans peculiarem ſibi parare ſuccum, ut in animalium ſanguine, in ipſis etiam individuis, dubitare poſſumus. Hic itaque ſuccus, delatus in ſingulas partes, roris inſtar affunditur, & concreſcendo ipſas auget, & ad debitam magnitudinem perducit. Quare, quò aquoſior eſt, ut in *populo* & *ſalice* evenit, facilè evaporat, nec exteriorum injurias arcet. In *quercu* ſingulæ fibræ & utriculorum ordines tam valido & quaſi glutine lucido irrorantur, ut firmum corpus excitetur; quod non ſolum diviſioni, ſed & aquæ aeriſque ſalinis particulis, ſi quando urgeant, abundè reſiſtit. In *pruno*, *ceraſe*, *piro*, & reſinoſis lignis, non rarò evaporante hujuſmodi nutritivo ſucco, jam fibris aſperſo, congeries quaſi tubulorum & orbiculorum membranoſorum ſupereſt; ſolæ enim tunicæ vaſorum & horizontalium utriculorum tenues & graciles ſuperſunt, quæ ſingularum particularum delineamenta exhibent.

De Caudicis augmento, & Nodis.

ARborum trunci ſucceſſivis annorum temporibus ſua acquirunt incrementa; unde in ingentem etiam excreſcunt molem: Hæc itaque ſuâ egent indagine, & ut quæcunque additamenta, arboribus contingentia, prout licet, nobis emergant, varia ſurculorum ſegmenta obſervanda venient. TAB. 8. Inter cæteras arbores patentiùs occurrunt in *caſtaneis* 32, quarum icones examinabimus. Sectus ſurculus paucorum menſium, tenellus adhuc, exteriùs quinque obtuſis angulis *A* eminet; hic triplici conſtat parte, craſſo *ſcil.* cortice *B*, ligneâ portione *C*, & contentâ medullâ *D*. Corticem de more excitant utriculi *E* tenelli, & virides, ſucco turgidi, & versùs lignum, fiſtularum lignearum fines & ora *F* circumlocantur. Succedit lignum, quinque pariter appendicibus *G* protuberans: Lignea hæc moles fibrarum faſciculis coagmentatur, in quibus trachearum *H* ora aperiuntur; non in unicum diriguntur centrum, ſed versùs medullam inclinati variè ſituantur; unde in ſurculorum inchoamentis probabile eſt, velut in annotinis caulibus, fibrarum faſciculos per medullam & corticem continuatos diſpergi, & confuſo quaſi ſitu locari; urgente tamen cortice & medullâ in zonam ligneam diſponi, debitâ ſenſim acquiſitâ versùs centrum inclinatione. A cortice inter ligneos faſciculos, utriculorum interpoſiti ordines *I* excurrunt, & in medullam *D* laxantur. Hæc quinque pariter appendicibus conſtat, quarum meridionalem reſpiciens regionem *K* acuminata eminet; oppoſitæ autem *L*, *M*, versùs ſeptentrionem directæ, obtuſæ valde, amplum quaſi ſinum efformant; orientalis quoque appendix *N*, ampla, non multùm protuberat; è converſo verò occidentalis *O*, oblongiori tractu producta, angulum efformat: Medulla hæc taliter configurata corticalibus utriculis componitur.

In eodem pariter ſurculo 33, ſex elapſis menſibus talis emergit exterior configuratio. Exaratæ enim quinque appendices *A* eminent, & intermediæ ſurculi partes *B* tumidiores redditæ ſenſim ad rotunditatem ſurculum deducunt. In Cortice geminus fibrarum ordo *C* eminet; reliquum verò utriculis *D*, epidermide contentis, coagmentatur. Lignum pariter ſuas habet eminentias *E*; hujuſmodi fibroſis faſciculis coagmentatur, qui variam magnitudinem ſortiti, in medullam *F* inæqualiter terminantur; diverſam habent inclinationem, & in ipſis plura trachearum ora aperiuntur. A cortice, inter ligneos faſciculos, utriculorum ordines excurrunt in medullam, quæ tribus ditatæ appendicibus, quarum ſuperior *G* versùs meridiem dirigitur, amplior verò *H* occidentalem reſpicit oram.

Paulò inferiùs factâ inciſione in parte ejuſdem rami 34, ætatis menſium decem & octo, ſegmentum habebis, cujus exterior ſuperficies ferè rotunda eſt obliteratis angulis: Cortex quatuor fibrarum ſeriebus *A* irrigatur, quæ utriculorum ordinibus *B* ambiuntur. Contenta lignea portio geminis fibrarum involucris coagmentatur, priori enim ſuperioris anni ligneo

invo-

involucro *C*, in quo exiguæ aperiuntur tracheæ, novus circumducitur circulus, & quasi ligneum involucrum *D*, latius priori, quod fibrarum fasciculis componitur, in quibus trachearum ora *E* versùs interiora aperiuntur; nonnullis etiam minimis, exteriùs emergentibus, medulla *F* utriculis constans, latam appendicem *G* extra corticem habet, quæ erumpentis rami exortus est. Appendix meridionalis *H* minor reddita conspicitur; orientalis, licèt arctior, adhuc elongatur.

Succedit duorum annorum cum dimidio segmentum ferè rotundum 35, hujus cortex sex fibrarum ordinibus *A*, & quandoque pluribus componitur; geminis antiquioribus involucris *B C* novum extenditur additamentum *D*, in cujus ligneis fasciculis trachearum insignes hiatus *E* aperiuntur; medulla *F* & ipsa adhuc appendices servat, quarum occidentalis *G* procerior est, meridionalis tamen *H* minor, pars verò opposita *I* geminâ erumpente appendice protuberat.

Postremum segmentum in eodem ramo excitatum annorum trium cum dimidio 36 eandem servat circumscriptionem: Ejus cortex octo fibrarum ordinibus, & etiam pluribus interpositis utriculis constat. Ligni cylindrus quatuor involucris sese ambientibus constat *A B C D*; postremò additus circulus ampliori constat crassitie, & hujus trachearum ora *E* præ cæteris ampliora sunt. Inter ligneos fasciculos occurrunt utriculorum transversalium ordines *F*, qui non perpetuò continui sunt à cortice in medullam, sed novi suboriuntur ordines: Inter fibrarum fasciculos, appendices *G* quædam observantur, quæ utriculorum transversalium portiones extant. Medulla *H* arctior reddita adhuc appendices promit. In reliquis subsequentibus segmentis eandem servare videtur Natura proportionem, ita ut singulo anno novus emergat ligneus circulus. Consimilem speciem exhibent segmenta *quercûs* & similium; unde concludere possumus, truncos, & ramos inde emergentes, singulo anno additamentum recipere, novo addito exteriùs fibrarum & trachearum involucro.

Pari incremento procedit Natura in *Ossium* augmento. Fœtûs ossa, & cranium præcipuè, filamentorum progressum exhibent; hæc non omnino sibi parallela sunt, & hinc inde breves appendiculas filamentosas promunt, quibus invicem colligata, rete efformant parum à *libri* natura distans, cujus potiores areæ & tota fibrarum compages exsudante osseo succo repletur, & tumet: Successivis incrementis nova fibrarum plana superinducuntur, quę præexistenti lamellæ osseo agglutinata succo, debitam molem & firmitatem excitant. Patent autem singula plana, resolutione factâ per longam ossium macerationem; integræ namque osseæ reticulares bracteæ evelluntur: In abortibus verò, in cranio inchoatum rete evidenter conspicitur. *Dentium* pariter compages hic non parum lucis affert; horum structura præ cæteris minùs obscura est in quadrupedum tenellis dentibus, & præcipuè vitellinis, in piscibus pariter, & in animalium arboribus. Duplici excitantur parte, quarum interior ossea lamella fibrosis & quasi tendinosis capillamentis, in naturam retis implicitis, constat; huic superextenditur alterum involucrum valde crassum; quod à pri-

primordiis mucoſum eſt, tractu tamen temporis oſſeum redditur, candidum, & durum.

Non longè à radicibus in exteriori lamella filamentorum 37, quaſi ordines *A* ſurſum deducuntur, qui lineam criſpam ad latera inclinatam *B* deſignant. Non ſunt autem continua corpora, filamentorum inſtar, à radice ad ſummitatem producta, ſed innumeri ferè ſunt contigui quaſi pili, qui parum aſſurgentes talem deſignant lineam; unde ſectus per longum dens, interioris oſſeæ lamellæ *C* progreſſum objicit, cui adnaſcitur aliud externum involucrum *D*, quod quaſi aſſurgentibus pilis conglomeratur, quorum diſtincta compages oſſeo affuſo ſucco obſcuratur.

Adhuc hæreo, an Natura in oſſium productione primò ſtamina, filamentorum ſpeciem referentia, ducat, quæ in rete implicita plana efforment, hæcque tractu temporis ſolidiora reddantur, diſperſo ulteriori humore, qui & interſtitia repleat, & oſſea reddat? An verò filamentorum rete primò excitetur, non tantùm ad conciliandam ſoliditatem & concretionem, ſed ut à propagatis & diſperſis vaſis & nervis oſſeus ſuccus, veluti à cribro, adhuc fluidus, & petrificus humor & ſpiritus ſeparetur, & extrudatur, qui ſenſim effluens & concreſcens primò ſub pilorum ſpecie, tandem copioſiùs erumpens, adjacentia replendo ſpatia, metallicam & quaſi petrificam largiatur naturam & ſoliditatem. In lignorum petrificatione, & gypſi productione, filamenta primò tenuiſſima & cryſtallina ſeſe produnt, à quibus planorum contextura affuſo ulteriùs ſucco ſuccedit. Quare oſſium filamenta craſſa & tendinoſa probabiliter è vaſis, & præcipuè ſanguineis, quę frequentia intercurrunt, percolant oſſeum illum & petrificum ſuccum, qui interſtitiis affuſus & innatans longo tranſpiratu ſolideſcit. Oſſeus ſuccus in animalibus luxurians, & ab ipſis oſſibus & tendinibus effluens, paſſim obſervatur in hujuſmodi partium fracturis, & inciſionibus. Muſculorum pariter multiplices tendines, temporis diuturnitate oſſei redduntur. In Gallinaceis circa articulos ab oſſibus exſudans icor conſimiles producit appendices, & tophos. Memini, in bove intra calvariam ingentem oſſeam molem obſervaſſe (quam adhuc ſervo.) Hęc ſuis circumdata membranis & vaſis ſanguineis, alterum cerebrum cum appenſo cerebello æmulatur. Hanc autem à primordiis *glandulam* fuiſſe reor, & caſu excitato oſſei ſucci percolatorio folliculo, ita in hanc degeneraſſe naturam & molem, rationi conſonum eſt.

Horum & ſimilium indagine probabiliter ſuſpicari poſſumus, fibris & tranſverſalibus utriculorum ordinibus, quibus lignum contexitur, peculiarem affundi ſuccum, quem ſuperiùs indicavimus; cujus corporaturâ & concretione varia firmitas & durities ligno comparatur. Longum tamen requiritur tempus, ut recenti ligno talis concilietur ſoliditas, qualis deprehenditur in præexiſtenti ligno; unde nova inducta lignea additamenta *adipes* dicuntur, & à colore ſubalbo *alburnum* appellantur. Talem duritiem non ſortiuntur, quam ſubcreſcentia inſecta non erodant; unde teredini ſummè obnoxia ſunt. In *quercu*, octo circulos & involucra *alburnum* conſtituere vidi; quare, cùm facilè aeris & aquæ injuriis cedant, à mechanicis ut inutilia abjiciuntur.

Arborum

Arborum igitur & ſimilium Trunci, indeque emergentes Rami, novis quolibet anno additis ligneis involucris compaginantur; unde proceres aſſurgunt etiam caudices, qui ex fibrarum implicatione ſolidiores redditi, ventorum impetus & materiæ pondus ſuſtinere valent. In Herbis verò aſſurgentes quidam cauliculi, quorum delineavimus ſegmenta, ut plurimum diſperſis per medullam fibrarum & trachearum faſciculis, ligneo circulo exteriùs circumducto componuntur. Quare cùm ferè annotini ſint, in his auctionis ordines non ſuccedunt; & cùm laxiori donentur compage, externorum injuriis facilè cedunt. Unum habent plærique Herbarum cauliculi commune cum quibuſdam Arboribus, & ſtipitibus, ad majus robur & œconomiæ commodum; *Nodos* ſcilicet, qui articuli & interdum genicula appellantur: Ab hujuſmodi namque tumoribus geniculatim vel articulatim prodeunt Rami. Horum ſtructura mira eſt, & in arboribus, reliquiſque durioris & auctioris compaginis, omninò obſcura. Quare ipſam rimari expedit in Caule, cujus lignei faſciculi magis diſtant, & ipſarum ambiens medulla maceratione obliterari poteſt, ita ut quælibet fibræ integræ ſeparari poſſint. In *caule* itaque *grani Turcici* macerati, *nodorum* compoſitio minùs obſcura præ cæteris extat. Eſt autem *nodus* ramificatio, novaque implicatio, ut & recentia folia erumpant, gemmaque promatur.

Sub oculis icone mihi non licuit integrum nodum, ſingulas *ſcil.* implicatas fibras, apponere, ſed facilioris intelligentiæ gratiâ placuit fibroſi unius faſciculi 38 productionem delineare. Quilibet fiſtularum faſciculus per interiorem medullam diſperſus, paulò infra nodum propagines emittit; quarum aliquæ *A*, interdum contiguo faſciculo inoſculantur; reliquæ verò *B* proximis fibris *C* aſſociatæ, à centro versùs peripheriam deductæ, occurrentes fibroſos faſciculos ſuperequitant eleganti implicatione; inter ſe autem anaſtomizatæ, rete *D* efformant, & tandem corticem perforando, partim in novellam gemmam, partim in folium abſumuntur. A penitioribus igitur erumpentes, exteriorem nodi partem taliter percurrunt: Ubi enim ab interſtitiis fibrarum lignearum, quibus exterior ambitus excitatur, emergunt, ſtatim in rete *E* implicantur; & tandem ipſarum nonnullæ, aſcendentibus fibroſis faſciculis *F* unitæ, ſurſum producuntur, aliquæ in folia diramantur, reliquæ ad latera obliquatæ *G*, in gemmam diriguntur.

Nodus igitur eſt productio recentis ſobolis in fibris ligneis & tracheis, ut exteriùs derivata in nova folia, & plantulæ ſurculum, *ſcil.* gemmam, compingatur. Et quoniam fortis exigebatur alimenti miſcela, & caulis robur, ideò exarata fibrarum implicatio neceſſaria fuit. Interiores fibrarum faſciculi cum exterioribus communicant, & à ſingulo faſciculo multiplices promuntur fiſtulæ; quare aliæ ſurſum, aliæ in folia, reliqua in gemmam deſinunt. In arboribus, ubi rami producuntur, reticulares quoque propagines à quolibet ligneo involucro promuntur, quæ unitæ cylindrum efformant, ramum *ſcil.* conſimilem trunco; unde in utriſque à natura delati alimenti rudis miſcella promovetur.

Taliter compaginantur Caules & Caudices quorundum Fruticum; ut

plurimum tamen ubi nodi excitantur. Trunci unico ligneo involucro contenti ſunt, & reliquum medulla tenere ſolet, vel ſaltem, ipsâ abſente, vacuum relinquitur. *Caulium* pariter compages varia eſt; nam plærumque diſperſi per medullam faſciculi fibroſi, cylindrum efformant; quandoque tubuloſi ſunt, & non rarò multiplex occurrit vacuitas; unde ipſorum ſegmentum horizontale rete delineat. Caulium & caudicum quoque varia exterior eſt forma, quæ nudis oculis patet; & hæc à fibrarum vario ductu, quæ in folia & ramos derivantur, exortum trahit. Hanc ſi ſignatim recenſere vellem, plantarum integram hiſtoriam contexere tentarem.

De GEMMIS.

VEgetantium genus, ut debitam magnitudinem ſortiatur, & ſuæ mortalitatis jacturam ſucceſſivâ prolis eductione reparet, ſtatis temporibus novas promit partes, ut tandem emergentes *uteri*, recentes edant *ſoboles*. Emanantes igitur à caule, caudice, ramis, & radicibus novellæ hujuſmodi partes, non illico laxatæ extenduntur, ſed compendio quodam coagmentatæ intra folii axillam cubantes, non parum ſubſiſtunt. *Gemmæ* autem appellantur, eo quòd lacrymarum inſtar conglobentur; frequentèr etiam *oculi* vocitantur. *Gemmæ* itaque ſunt veluti infans ſeu fœtus ita cuſtoditus, ut ſuo tempore auctus, in ſurculum excreſcens, tandem *ova* promat. Hæ noſtris hiſce regionibus circa *Junii* menſem erumpunt à tenello ſurculo mox germinante, & ita cuſtoditæ, tandem futuro vere aperiuntur, & adoleſcunt. Speciali compage conſtant *gemmæ* hoc quietis intervallo; ſuntque veluti infans involutus, ſeu eruca, in qua compendio quodam inſunt ultimi ſenii futuræ partes.

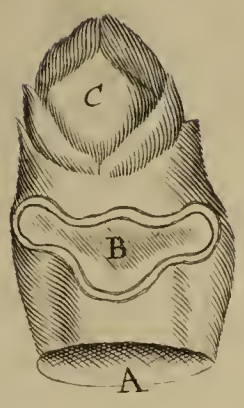
TAB. 9. Simplicioribus luſtratis *gemmarum* formis, inſigniores exarabimus. In *arundine vulgari*, oblonga eminet gemma 39 *A*, è ſingulo nodo ſupra antiqui folii inſertionem *B* emergens, mitrali conſtans formâ multùm depreſsâ, geminis excitatur foliis, quorum peripheriam pili *C*, ſurſum directi, criſpi & candidi, ornant; Intus angulare corpus *D*, viridibus foliis, ſeſe invicem ambientibus cæparum more, excitatum cuſtoditur.

In *olea* pariter gemmarum ſpecies ſimpliciſſima eſt; unico enim foliorum ordine 40 *A* conſtat, contentis intus minoribus foliolis *B*; ſingula lanugine ſeu cinereis pilis fungiſque cooperiuntur.

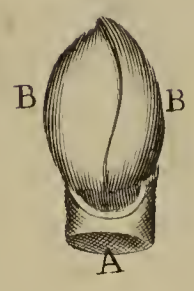
Eadem ferè ſtructura in herbaceis, & præcipuè in *viola martia purpurea* 41 conſpicitur, à cujus radice, ſeu ſepulto cauliculo *A*, *gemma* aſſurgit, geminis cooperta foliis *B*; reliqua intus cuſtodiuntur, & turgent, ut piniforme reddatur corpus.

Auctior gemma occurrit paſſim in arboribus, & arbutis; ut in *vite*, *lauro*, *ficu*, *rubo*, *ſambuco*, *moro*, & *nuce* 42. Hæc à tenello ſurculo *A* emergit, ſupra delapſi folii veſtigia *B*, & pluribus foliorum ordinibus *C* rubiginoſi coloris

F. 42.

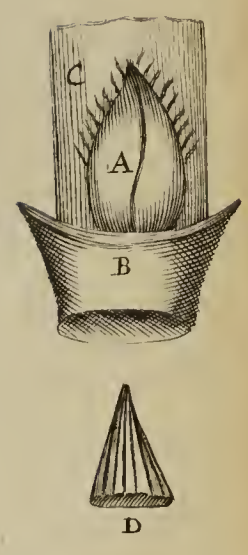


F. 41.



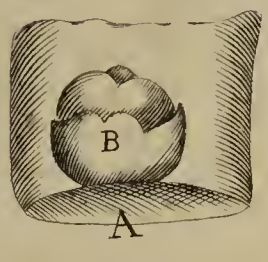
F. 40.

F. 39.



F. 43.

F. 44.



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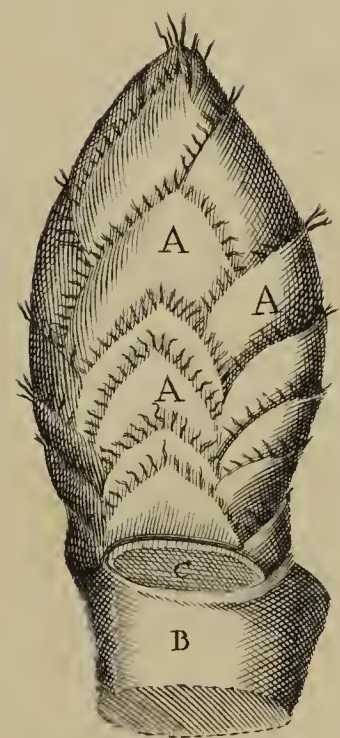
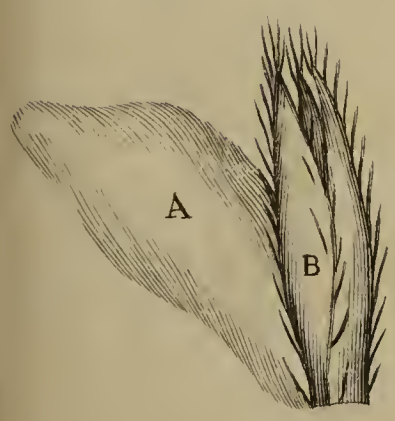


F. 46.

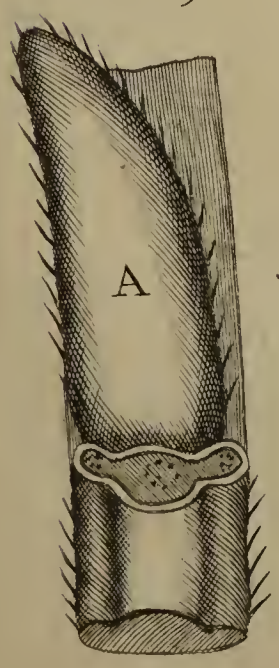
49

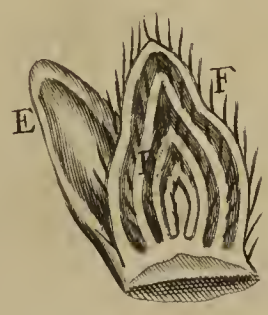


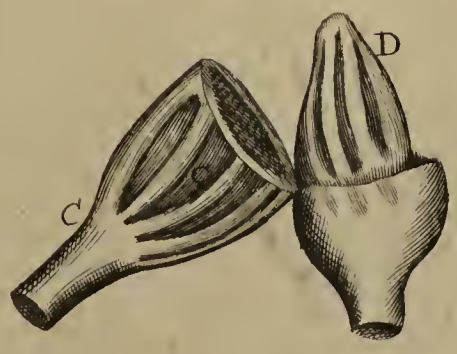
F. 47.

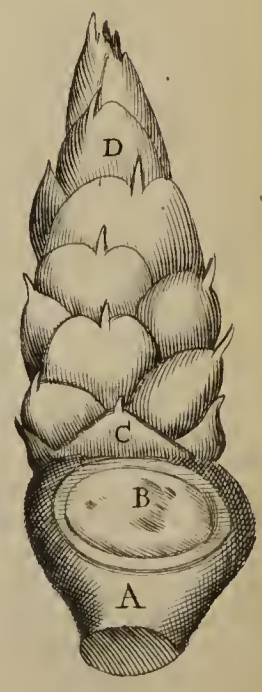
F. 48.

F. 49.









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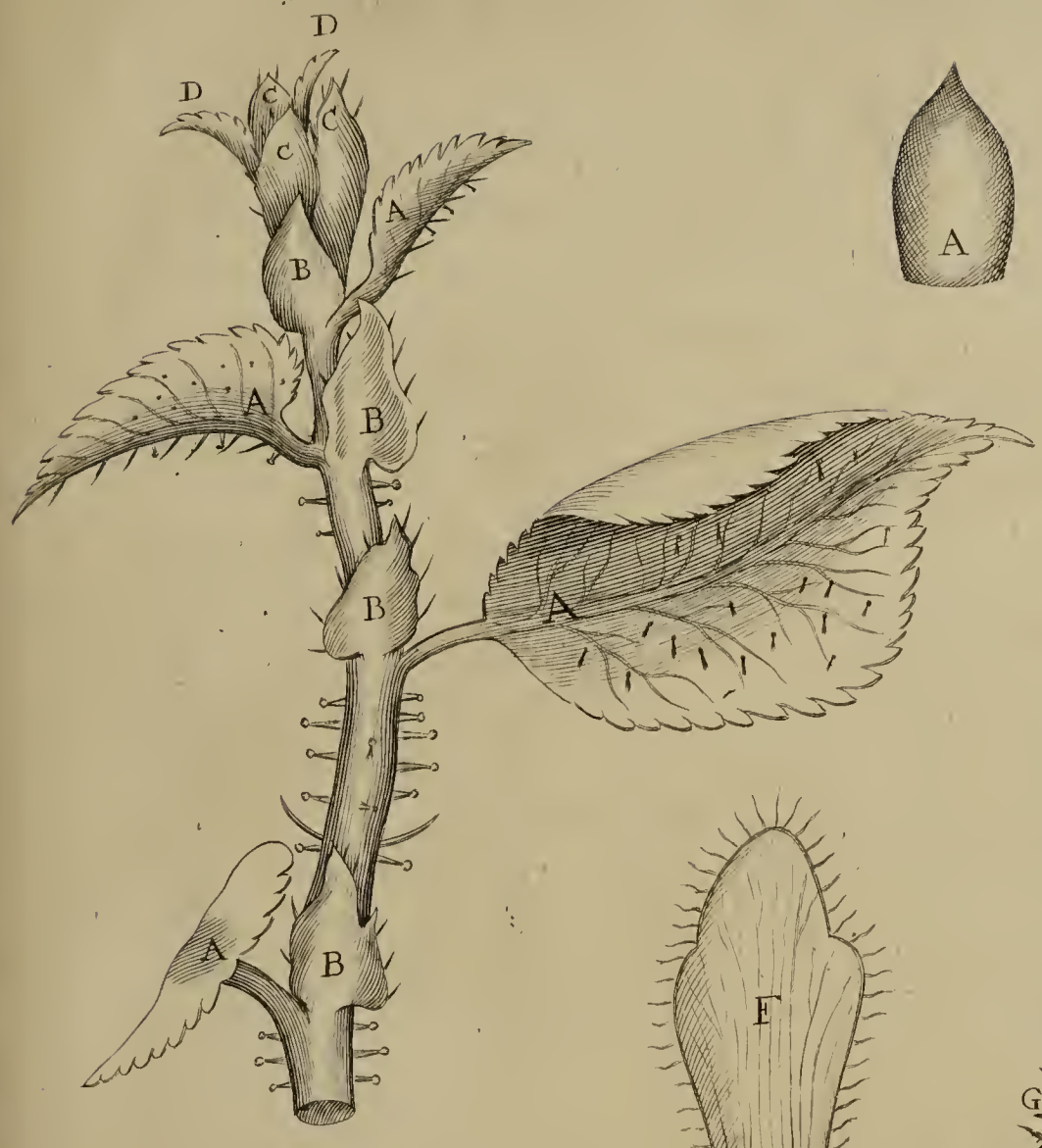

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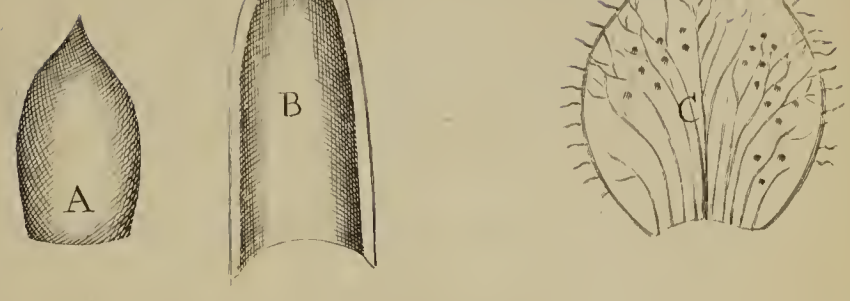

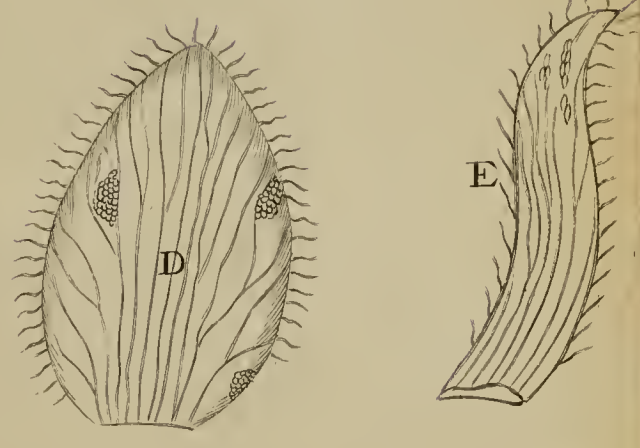

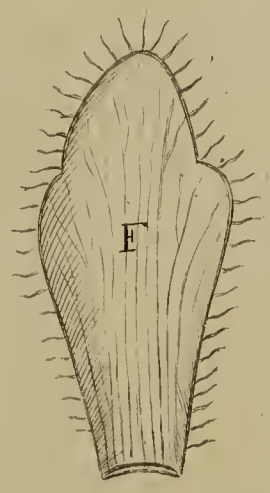

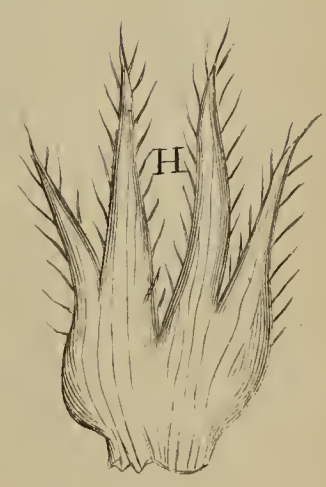

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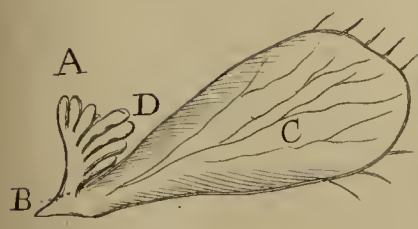

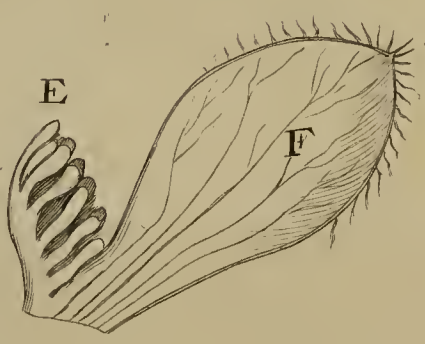

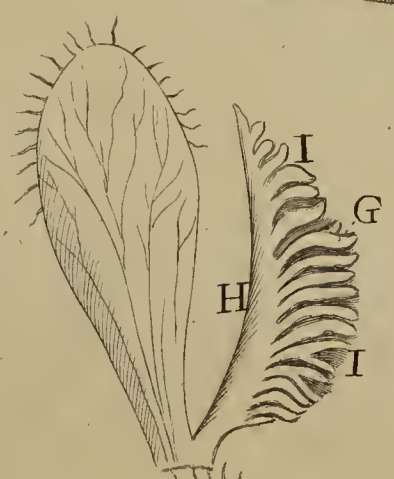

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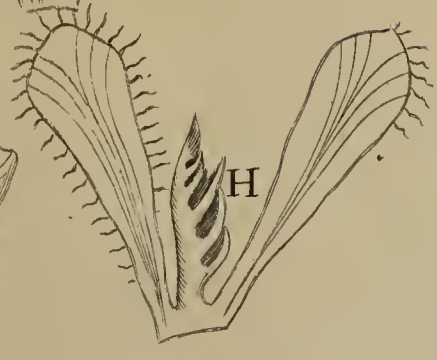

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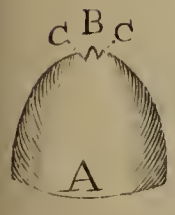
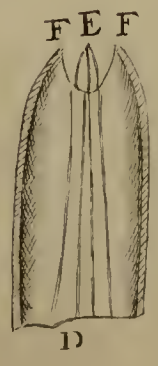
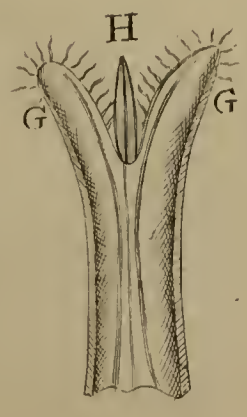
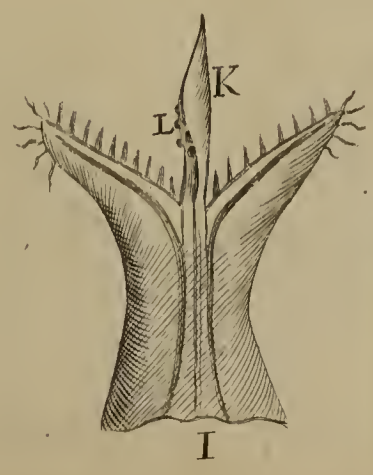
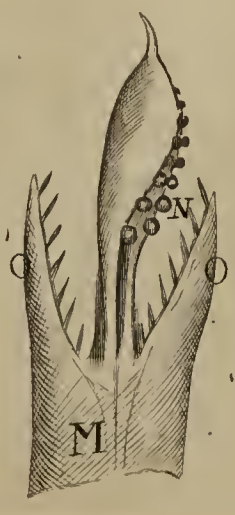










coloris conſtat : In aliquibus minima adſtat gemma ſuis pariter integrata foliolis.

Parùm abſimilis conſpicitur ſpecies in *herbaceis* ſub terra conditis, & præcipuè in *amarantho* 43 ; multiplici enim foliorum ordine *A* componitur, quæ acuminatam excitant gemmam.

Ebuli pariter gemma 44, à radicis cylindro *A* erumpens, multiplici latorum foliorum *B* ſerie donata conglobatur.

Oblongior gemma obvia fit in *avellanis* & *quercu* 45 ; in qua multiplices foliorum ordines *A*, ſquamarum inſtar, quaſi ovale corpus excitantes, procerum corpus, ab annunculo ſurculo *B*, ſupra delapſi folii cicatricem *C* erumpens, componunt.

In gramine 46 pariter conſimiles obſervantur gemmæ, à nodo hinc inde emanantes, acuminatæ valde; hæ æſtate proceriores & longiores redditæ pluribus foliorum ſeriebus *A*, ſquamatim locatis, in corniculare quaſi corpus curvantur.

Elegans pariter eſt in *pomis præcocibus* & *prunis* gemmarum ſtructura, attentâ foliorum formâ; à tenello namque 47 ſurculo *A* erumpunt ſupra delapſi folii veſtigia *B*. Primus foliorum ordo *C* minor eſt ; reliqui latiores & proceriores, ſquamatim ſeſe contingentes, ita ut pineale fiat corpus. A ſingulo folii apice appendix *D* una, quandoque tres in *malis Armeniacis* & aliis aſſurgunt.

Enaſcuntur *gemmæ* ab extremis ſurculorum apicibus, & perpetuò ſupra delapſi folii implantationem à lateribus pariter elongati ſurculi variè pullulant; alternatim in *ſalice*, *quercu*, & reliquis arboribus,& vegetantibus,ubi nodus non obſervatur ; in quibus autem extat, una interdum erumpit gemma, ut in *arundine* & *vite*; quandoque gemina, ut in *opio*, *vite alba*, & ſimilibus.

Mirabilis in *platano* 48 gemmarum ſitus ; à lateribus enim & extremo ſurculo *A* craſſefacto dilatatus folii pediolus *B* aſſurgit, qui tubuloſus redditus, contentam, veluti in vagina, gemmam cuſtodit ; unde laceratione revulſus *C*, ipſam *D* in conſpectum exhibet. Hæc ulteriori ambiente folio *E*, quaſi membraneo ſacculo, involvitur, quo diſrupto occurrunt folia *F* pilis conſperſa, quibus gemma excitatur.

Parum abſimili formâ, *ſalicis* 49 gemma munitur : Corticis hujus exterior portio in ſacculum, ſeu vaginam *A*, deſinit, quâ totus gemmæ ambitus cooperitur & tegitur ; quo lacerato gemma *B* ſeſe offert, foliolis invicem amplexantibus excitata.

Gemma, cùm ſit compendium ſurculi, iiſdem integratur, quibus rami componuntur. Inſunt tamen variæ metamorphoſes, in quibus Naturæ luſus eluceſcit : Nam aliquibus plantis foliola, quibus gemma componitur, temporanea ſunt, & ſingulo folio ſtabili, quo tandem ſurculus ornatur, hinc inde gemina adſtant ; quod in *ficu*, *avellanis*, *moro*, *quercu*, & *ulmo* 50 contingit, in qua ab elongata gemma folium ſtabile *A* pendet, & huic pediolo gemina adſtant foliola *B*, quæ temporis tractu exſiccata decidunt ; in reliquo ſurculi, caduca pariter folia *C* adhuc ſuperſunt, ſenſim emergen- TAB. 10.

emergentibus ſtabilibus *D*: Caduca folia variâ circumſcribuntur formâ, tum in diverſis plantis, tum in una eademque gemma.

In *ficu* 51 exteriùs ut plurimùm mitralia *A* ſunt. In *moro* & *caſtaneis* parùm concava *B*, oblonga, obtuſaque in apice aſſurgunt. In *avellanis* concava pariter, lataque ſunt foliola *C* copioſis irrigata fibris, utriculiſque donata. Parum abſimili donantur formâ caduca *ulmi* folia; lata enim ſunt abſque ulla lacinatione copioſis conſperſa fibris *D*, quæ non à communi coſtula oriuntur, ſed omnes à ſurculo, à quo emergunt. Interdum anguſtiora ſunt, talique conſtant formâ *E*. In *robore* & *quercu* ut plurimùm oblonga, gracilique conſtant ſpecie *F*, & plurimis, fibrarum productionibus irrigantur. In *viola martia*, caduca folia ita laciniata ſunt, ut appendices *G* ita graciles ſint, ut ſpinas æmulentur. In *malva* quandoque mitrale aſſurgit caducum folium; interdum in plura quaſi ſcinditur foliola *H*, quæ tandem tabefacta concidunt.

Folia ſtabilia, quorum generationem præmuniri caducis foliolis diximus, poſtremò vegetante geminâ emergunt, ipſorumque primæva ſpecies minima eſt, & ferè informis; ſenſim autem turgentibus coſtulis, & continuatis fibroſis faſciculis, manifeſtior redditur. In aliquibus, ut in *ficu*, folium à primordiis apertum & diductum eſt; in reliquis ferè omnibus complicatum & criſpum eſt, ita ut in primo exortu ſolus pediolus, indeque aſſurgens coſtula cum appenſis faſciculis appareat, nondum laxatâ folii latitudine.

Hoc apprimè miramur in *ulmo* 52, in qua ſtabilis folii *A* primò emergens ſtructura, pediolo *B* conſtat, caducis foliis *C* intimè unito; reliquum folii *D* complicatur, apparentibus tantùm coſtulis. Idem folium tractu temporis auctus *E* redditur, & utriculorum appendices, quibus folii latitudo excitatur, ſenſim laxantur, & caduca folia *F* proceriora fiunt. Poſtremò emergentibus coſtulis *G* à craſſo pediolo, & craſſiori aſcendente faſciculo *H*, exterior unguis *I* inciſuras patitur, & tandem in geminas aperitur partes.

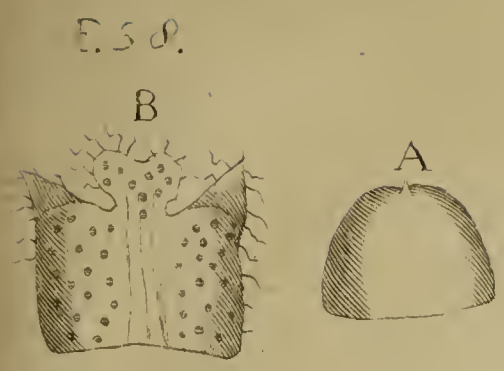
Evidentiùs in *robore* & *quercu* contingunt hæc omnia; etenim ſtabilis hujus folii ſpecies 53 tam parva eſt, ut vix microſcopio deprehendi poſſit. Inter caduca namque foliola *A* inchoamentum folii aſſurgit, quod turgente coſtulâ *B* excitatur cum gemina appendice. Senſim tres manifeſtantur coſtulæ *C*, à craſſo erumpentes pediolo *D*. Tractu temporis deductis coſtulis, folii latitudo *E* extenditur; & poſtremò, elongato fibroſo faſciculo *F*, novæ appenduntur coſtulæ *G*, & tandem fit exiguum folium, cujus latitudo *H* criſpa adhuc redditur.

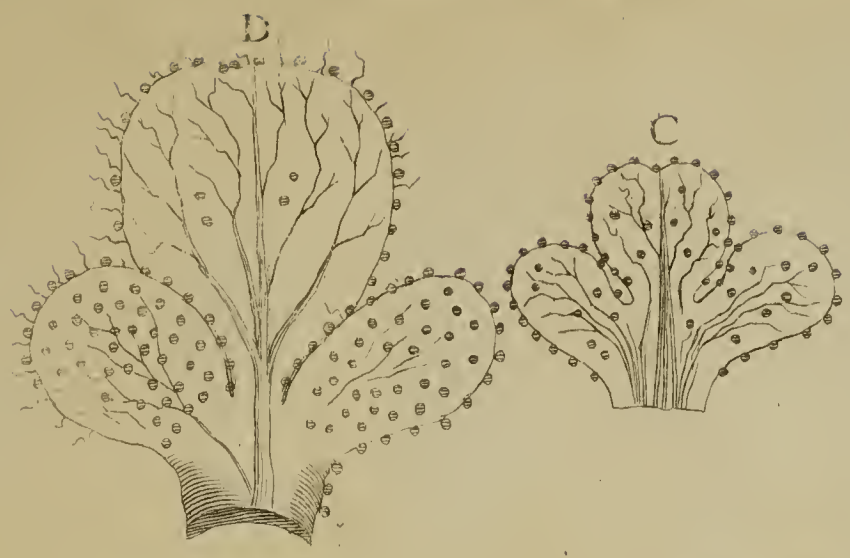
Non una perpetuò eſt naturæ methodus in augendis gemmarum foliis, ita ut primò caduca erumpant folia, mox ſtabilia emergant, & tandem, adauctis iſtis, illa contabeſcant, & decidant; ſed paſſim in pluribus arboribus gemmarum folia, & præcipuè, quæ baſim ipſius componunt, mitrali amiſsâ figurâ, novis mutationibus tandem in ſtabilia evadunt folia, quibus ſurculus condecoratur.

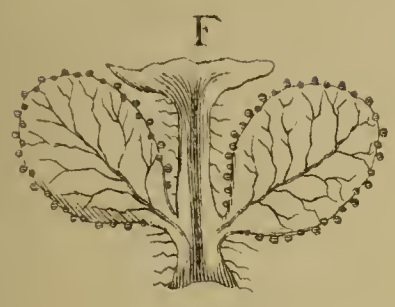
Novæ itaque formæ in diverſis vegetantibus obſervatæ, delineandæ

veniunt,

F. 58.







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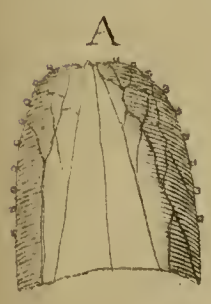

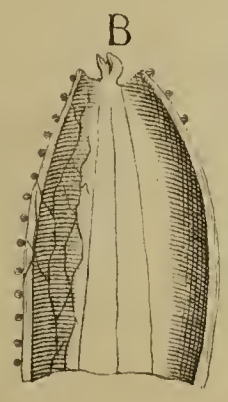

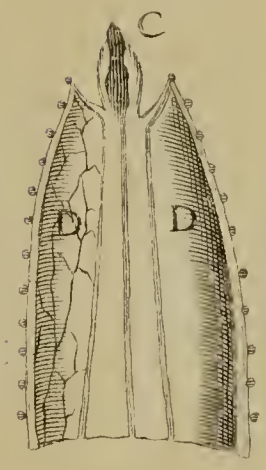

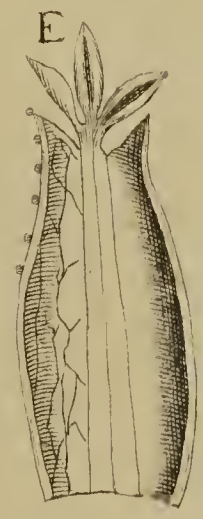

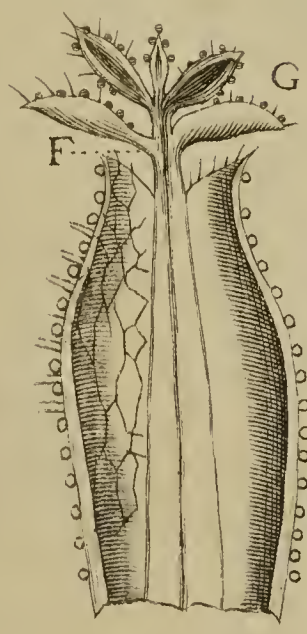

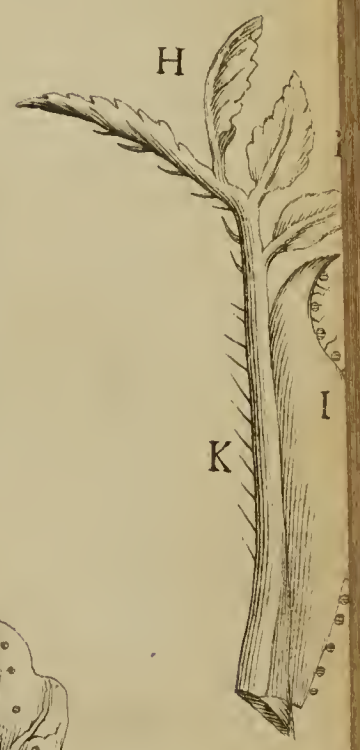

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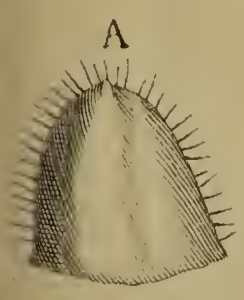

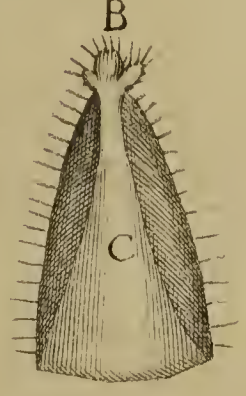

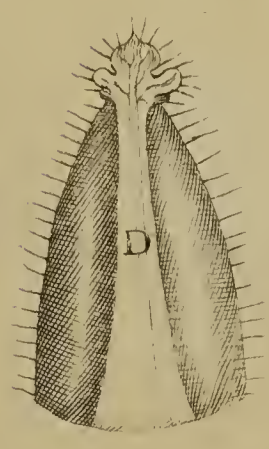

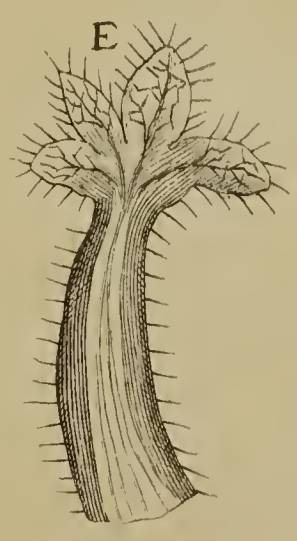

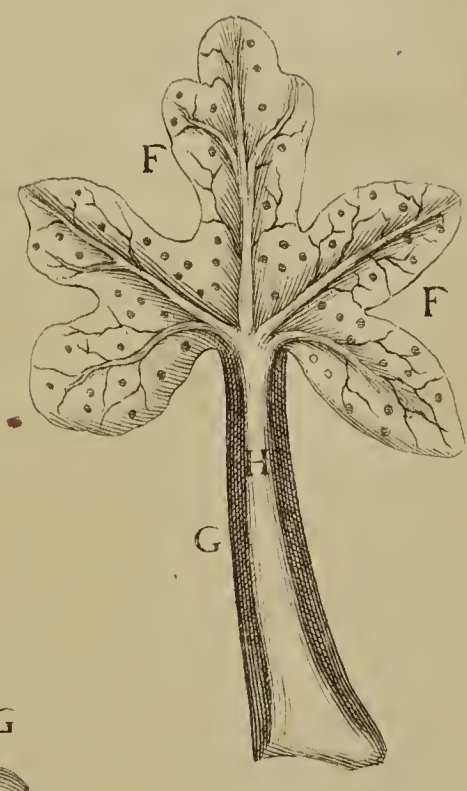

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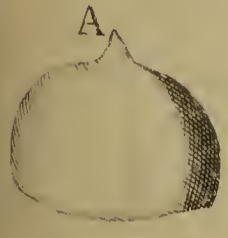
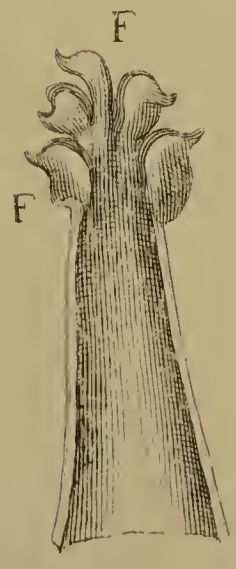
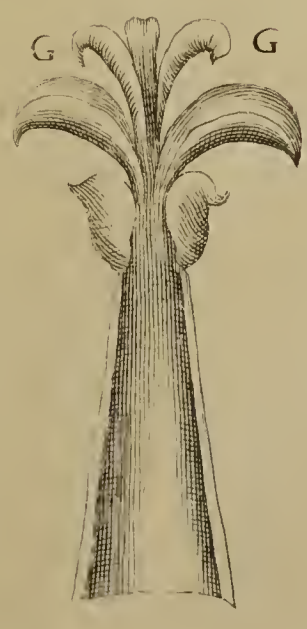
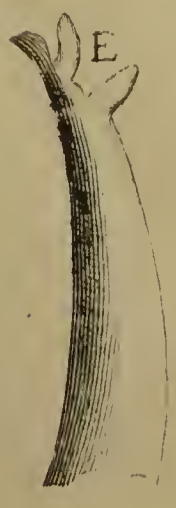
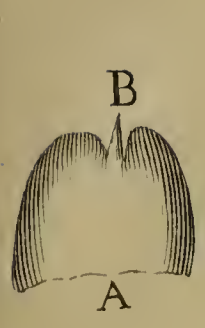
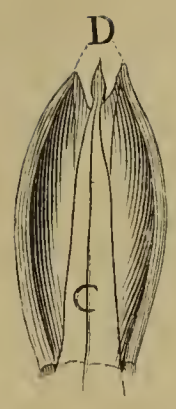


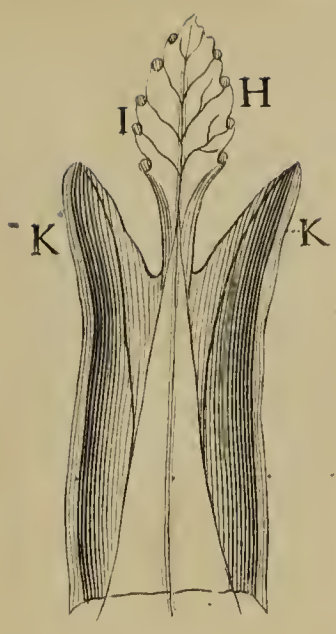




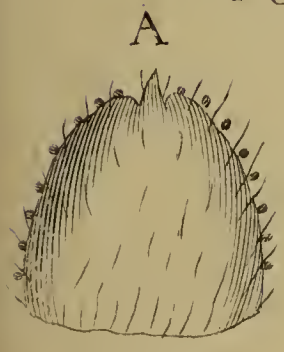


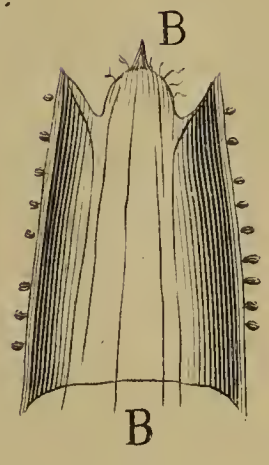


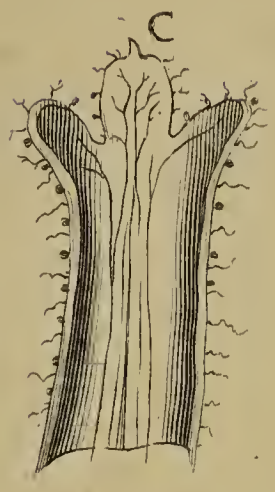


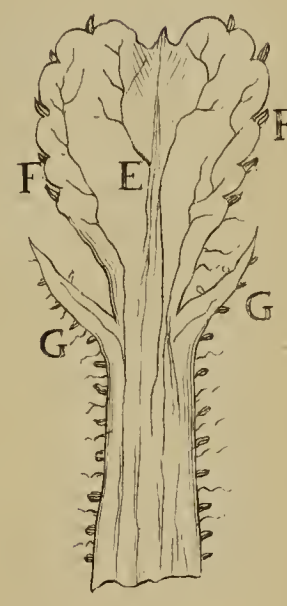


F. 56.

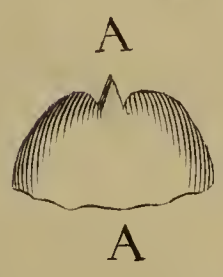


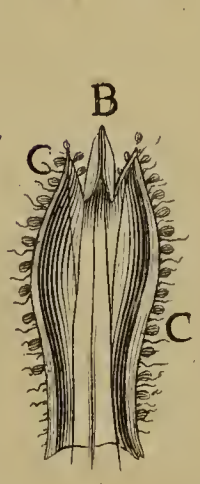


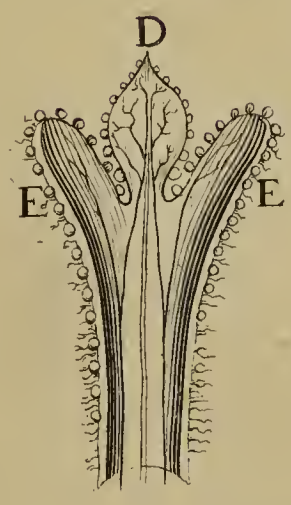


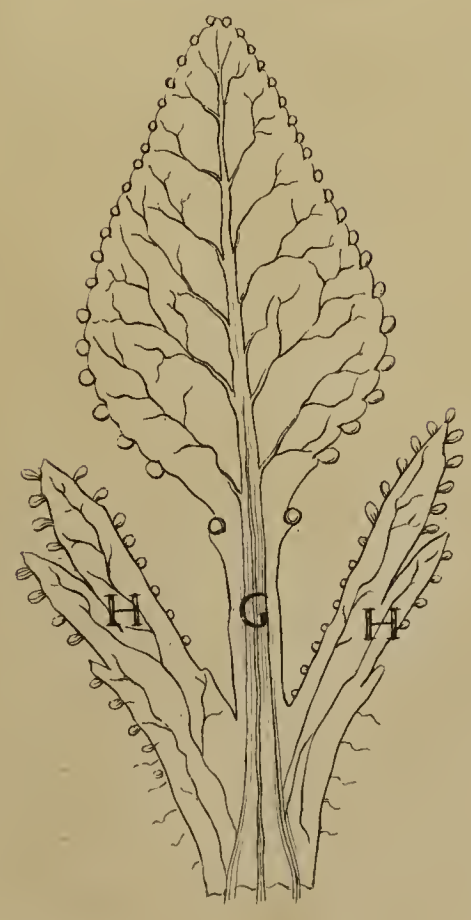


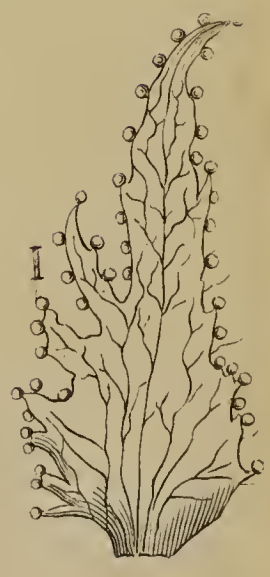
F 57











veniunt, & primò in *lauro*, & *perſica malo* 54, cujus folium à gemmæ baſi erumpens, mitraliq; conſtans formâ *A*, appendicem minimam *B* inter geminas lacinias *C* promit. Idem folium auctius redditum *D*, & parum concavum, triplici appendice turgere incipit, quarum media *E*, complicati & convoluti folii augmentum eſt; geminæ verò *F*, caduci folii inchoamenta extant. Brevi elabente tempore appendices *G* auctiores redditæ, caduci folii naturam redolent; contentum verò folium convolutum, geminis *ſcil.* partibus *H* intrò reflexis aſſurgit. Singula hæc magis manifeſtantur in folio *I*; & proceriora fiunt, dum ſtabile folium *K*, adhuc convolutum, adoleſcit, à cujus extremo ungue papillæ *L*, terebinthinæ colorem referentes, eminent. Stabile tandem folium *M*, latitudinem ſortitum, papillas *N* turgidiores reddit, caducaque folia *O* graciliora fiunt. Et poſtremo debitâ accedente magnitudine, caduca foliola *P* contabeſcere incipiunt; reliquum verò folii *Q* hiare incipit, emergentibus fibroſis coſtulis, & papillis unguem ornantibus.

Pari progreſſu *amygdali* 55 folia augentur: Primò etenim mitrale folium *A* propriâ donatur appendiculâ *B*; idem auctius redditum, fibrarum *C* in appendices *D* progreſſum exhibet. Succeſſivo incremento ſtabile folium *E* manifeſtatur, caducaque foliola *F* aſſurgunt; latius pariter temporis tractu folium *G* redditur, quod adhuc complicitum extat. Tandem laxatis folii partibus *H*, papillæ *I* ſubvitellini coloris emergunt; reliquum verò in caduca foliola *K* abſumitur. Ultimò, elongato folii pediolo *L*, caduca foliola *M* adſtant, & reliquum folii, papillis *N* & fibris *O* condecoratur. TAB. 11.

Conſimili incremento vegetant *promorum* 56 folia, à quorum apice appendix *A* primò erumpit; hæc auctior redditur in folio *B*, ſenſim laxatur in folium *C*, hujus unguis *D* laciniatur, & folii ſpecies emergit: Hoc auctius *E* redditum, papillas *F* promit, ejuſque pediolo caduca foliola *G* altis inciſuris ſeparantur, & poſtremò debitâ acquiſitâ formâ *H*, caduca foliola *I* contabeſcunt.

In *Malis Armeniacis* 57 evidentiùs ſucceſſivæ patent mutationes; folium enim *A* exteriorem gemmæ baſin cingens, auctius redditum, convolutum foliolum *B* promit; reliquum verò pilis & ſubrotundis tuberculis *C* ornatur: latius redditur folium ſtabile *D*, & crenis mediis caduca foliola *E* ſenſim extenduntur; hæc temporis diuturnitate inciſuris *F* ſoluta, auctiora redduntur; tandem elongato pediolo *G* caduca contabeſcunt foliola *H*: Horum forma varia eſt; frequenter ipſorum unguis in ſtyliformes ſolvitur appendices *I*, & rotundis globulis ornatur.

Cydoniæ mali 58 pariter auctio elegans eſt, ſenis diſtincta figuris *A*, *B*, *C*, *D*, *E*, *F*; in quibus caduca folia inſigni pollent magnitudine, & ſingula pilis, & papillis, terebinthinam fundentibus, cooperiuntur, & tandem tabefacta concidunt. TAB. 12.

Exaratam methodum non perpetuò adamuſſim ſervat Natura, ſed in aliquibus, loco caduci folii, appendices adſtant geminæ: Ita patet in *Romaſum* 59 gemmis, quarum primò latum folium *A* occurrit, hoc auctius

redditum, appendicem *B* efficit: Temporis progreſſu, altioribus excitatis inciſuris, foliolum *C* conglobatum ſenſim laxatur & aperitur; &, loco caduci folii, appendices *D*, fibris irrigatæ, extenduntur. Succeſſivis mutationibus foliola tria *E* emergunt, & pediolus oblongior redditur. Adaucto iterum pediolo *F*, ſtabilia folia *G* explicari incipiunt, & poſtremò diſtinctis foliis *H*, geminæ appendices *I*, graciles valde, fibroſo pediolo *K* adſtant, utriculis & pilis conſperſæ. Eundem progreſſum habent *rubi canini* folia, quæ tamen altiori inciſurâ ſeparata, pendent à pediolo; hæc frequenter permanent. Idem accidit in *rubo*, cujus foliola caduca contabeſcunt.

Mirabilem pariter auctionem molitur Natura in aliquibus arboribus & herbis, dum ipſarum foliola è gemmis aſſurgunt; tota namq; folii moles, quâ gemma excitabatur, in ſtabilis folii pediolum abſumitur & immutatur.

Hoc in *opio* 60, primò deprehenditur, cujus tenella gemma foliolis exteriùs componitur, quæ mitralem habent figuram *A*; ſucceſſivâ autem auctione, emergente folii inchoamento *B*, reliquum mediâ ſui portione in pedioli ſpeciem *C* deſignatur, quæ in grandioribus redditis foliis *D* manifeſtò patet: Interim ſtabilia folia *E* fibris conſperſa vegetant. Poſtremò adauctis folii partibus *F*, oblongus obſervatur pediolus *G*, coſtulâ *H* per longum excurrente.

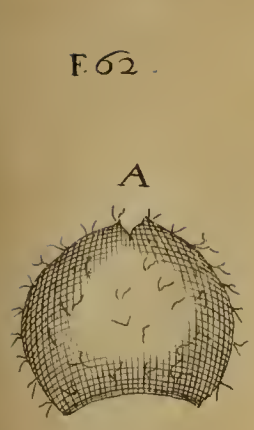
Paſſim hoc idem accidit in *ebulo*, *vite alba* & *ſambuco* 61, cujus externum tenellumq; folium ſtyliformi appendice *A* donatur; idem auctius redditum, ſubrubicundis utriculis turget, & quinque foliorum *B* rudimenta emergunt. Hæc tractu temporis manifeſta *C* fiunt, & reliquum *D* gracilius & longius redditur; adhuc tamen complicata jacent ſtabilia foliola *E*, quæ ſenſim auctiora conniventibus partibus *F* luxuriant: Hæc tandem hiare *G* incipiunt, & poſtremò patula *H* fiunt, & ab elongato pediolo *I* pendent.

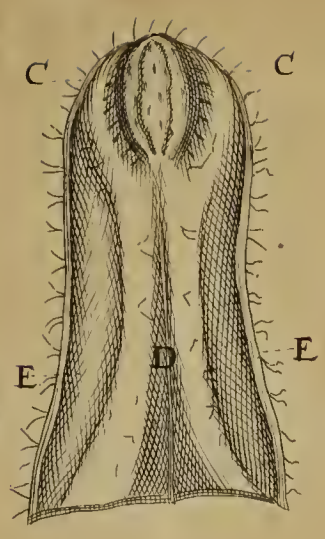
TAB. 13. Elegans eſt foliorum *nucis* 62 incrementum; nam à mitrali forma *A*, quæ primò emergit, oblongior conſurgit ſpecies *B*; ſucceſſivo augmento oblongius redditum folium, in apice inciſuras aperit, unde appendices ſeu foliorum inchoamenta *C* emergunt; pedioli quoque *D* delineamenta apparent, ipſique adhuc hærent, veluti alæ *E* folii portiones. Elongatur ſenſim pediolus *F*, & gracilior redditur; ſimulque foliorum *G* eruptiones, luſtrata eorum de ſylveſtri parte, manifeſtantur: In eodem pariter folio interiùs patent emergentes coſtulæ *H*, quibus foliola coagmentantur: Tandem, gracileſcente pediculo *I*, internodia *K* elongantur, & laxata folia *L* ſenſim aperiuntur; exterior pediculi pariter portio fungis & pilis *M* cooperitur.

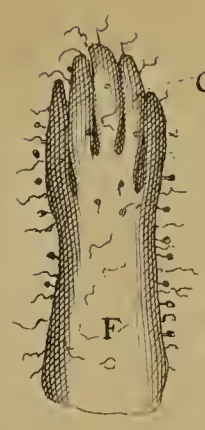
In *malis limoniis* & *aurantiis* 63, foliorum augmentum miro pariter ſuccedit artificio. Exteriora gemmæ foliola quandoque mitralia *A* aſſurgunt; interdum curvatam promunt quaſi ſtyliformem appendicem *B*; reliqua verò *C* brevi pollent pediolo, à quo folii inchoamentum *D* elongatur; quæ omnia veſiculis oleo refertis aſperguntur, emergentibus pariter

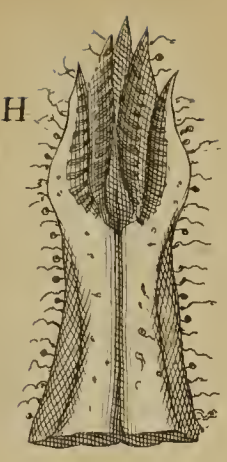
pilis

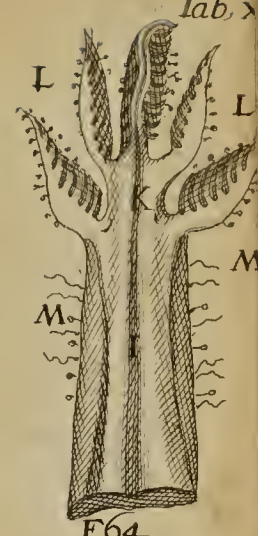
F.62.





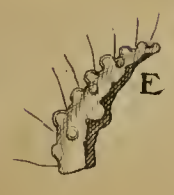


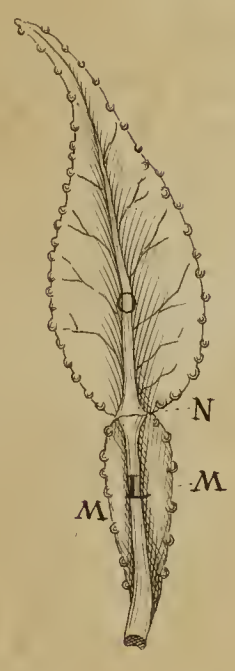


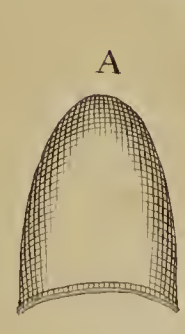


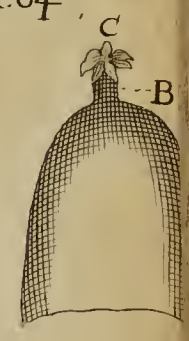
F.64.

F.63

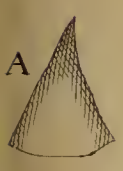


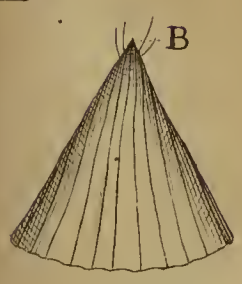


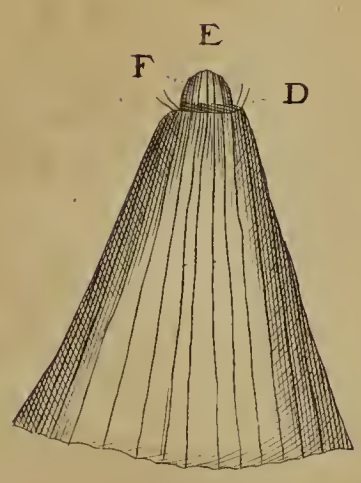


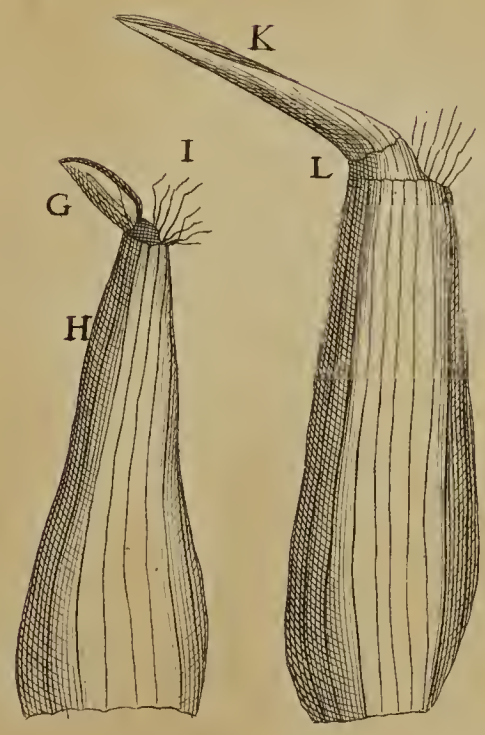


F.65.









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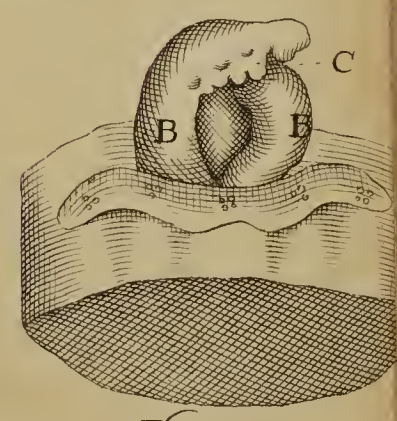
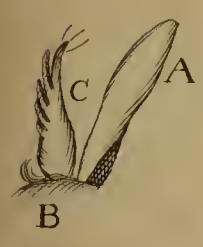


F.69.

F.67.



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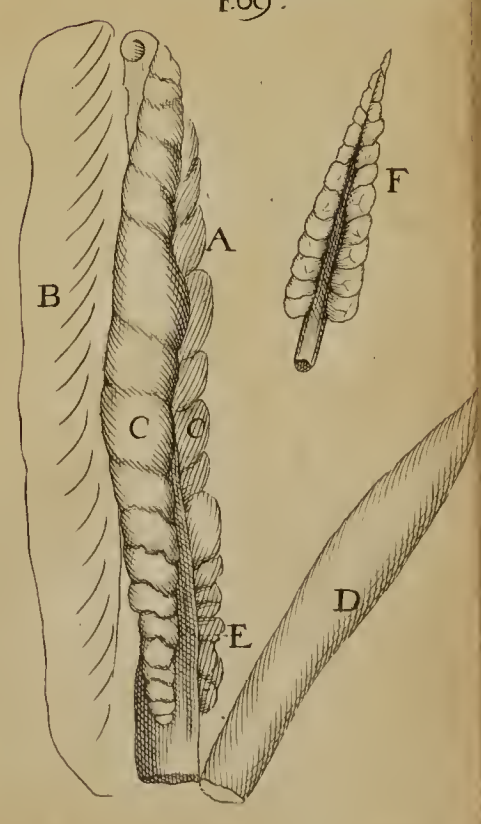

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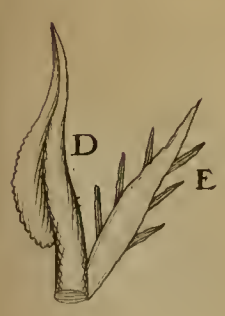

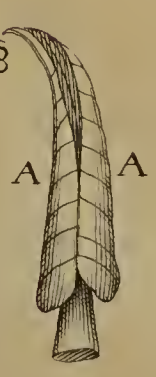

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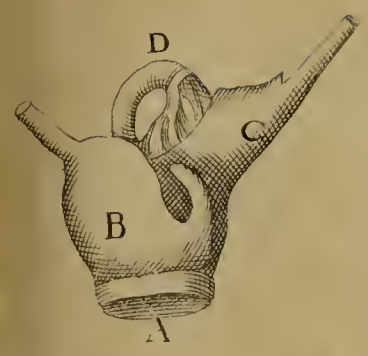

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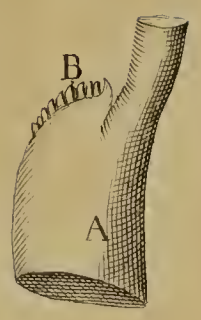
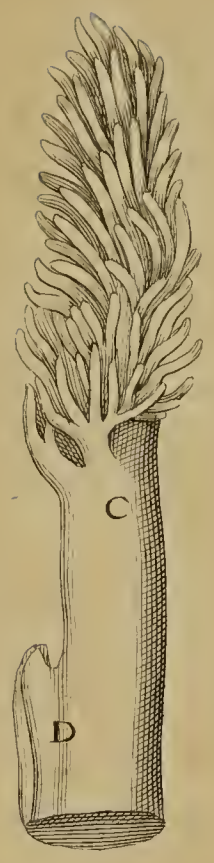
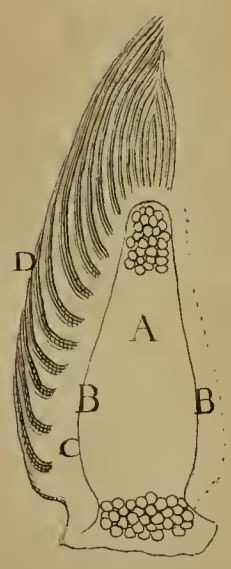




F.73.

F.74.



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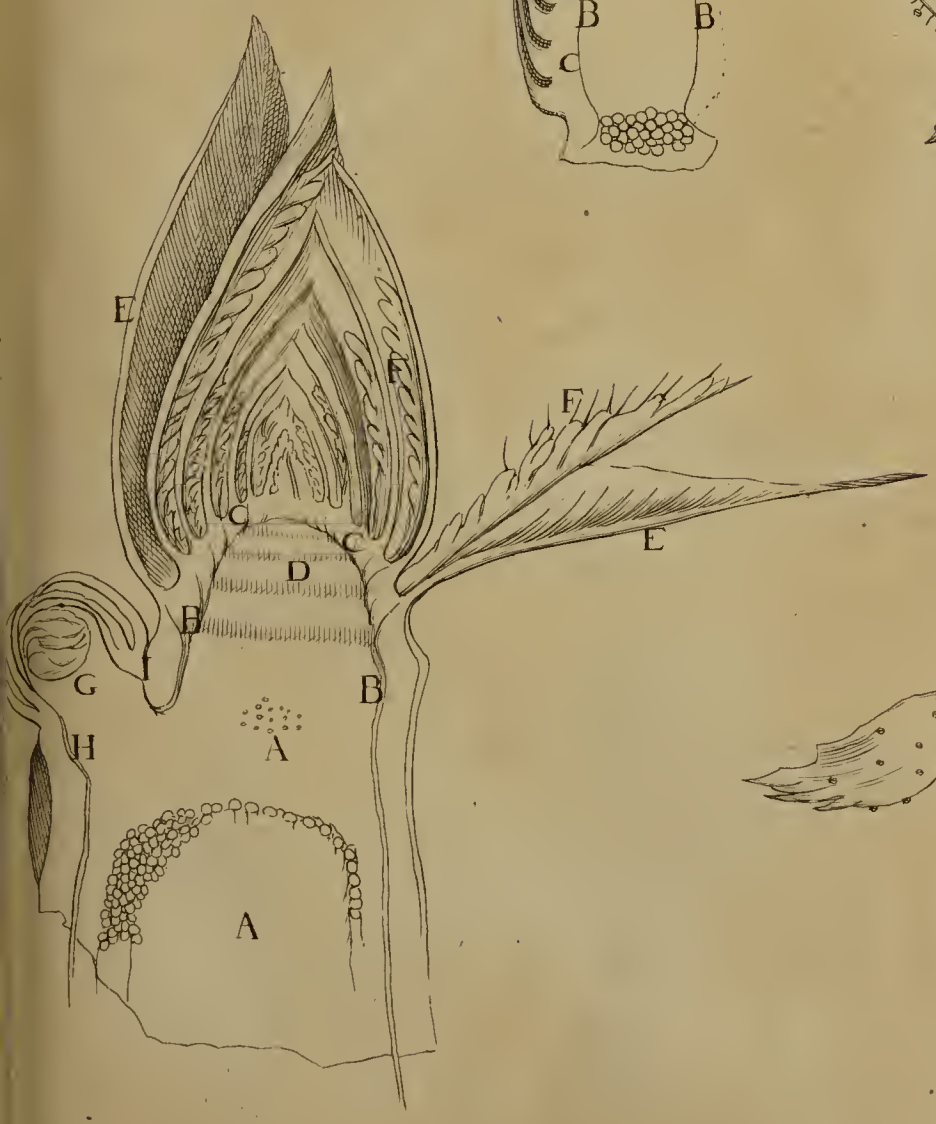


F.76.

pilis; interiùs verò concavitas quædam excitatur : Auctius redditum foliolum *E* ſenſim extenditur, magiſque turgent oleoſi utriculi : Tandem excitatâ crenâ inter pediolum *F* & reliquum *G* folii, exteriora versùs curvatur. Potiori accedente incremento vera folii ſpecies advenit; à coſtula enim *H* ligneæ fibræ diramantur, cui pediolus propriis ſtipatus appendicibus *I* connectitur. Tractu temporis geminæ folii partes *K*, veſiculis refertæ, laxantur, & hiare incipiunt, quod idem pediolo contingit; & poſtremò in expanſo folio pediolus *L* cum geminis appendicibus *M*, caducis foliolis analogis, per articulationem *N* elongatæ coſtulæ *O* continuatur.

Quædam pariter herbarum folia analogo vegetant incremento; ita in *aquilegia* 64, gemmæ folia *A* obtuſam hanc figuram acquirunt, à cujus apice appendicula *B* erumpens, folii, cujus minimæ partes *C* conglobatæ parum eminent, rudimentum exhibet. Succedente incremento, laciniatæ folii partes *D*, invicemque complicatæ manifeſtantur, & folii pediolus *E* concavus & latus luxuriat.

Evidentiùs hoc idem deprehenditur in *graminis* 65 gemma, cujus foliola acuminatâ conſtant formâ *A*; hæc in apice Zonam *B* diluti coloris promit, à qua pili *C* erumpunt : Accedente ulteriori incremento ultra Zonam *D* ſtabile folium *E* producitur, elongatis ligneis fibris & fiſtulis *F*; quod ſenſim adauctum *G* deorſum flectitur, & Zona inter pediolum *H* & folium *G* latior redditur, cujus interiora pili *I* ornant : Tandem hiante folio *K*, Zona *L*, quæ ſui generis nodus eſt, decolor, fibrarum contextu excitata, loco articuli inſeritur.

Tot igitur mutationibus diverſa *gemmarum* genera incrementum ſortiuntur. Aliqua tamen ſuperſunt, quorum productionem Natura non tanto partium apparatu moliri videtur.

Ita in *braſſica* 66, & ſimilibus, erumpens gemma *A* binis exteriùs excitatur foliis, à quorum craſſo pediolo *B*, graciles criſpæque appendices *C* pendent, & ſucceſſivâ vegetatione in folium extenduntur : In aliis autem, ut in *anchuſa*, *eryngio*, *rapis*, & analogis bulboſis, ab antiquo cauliculo gemmæ aſſurgunt complicatis foliolis, quorum coſtulæ præ cæteris eminent, nullo erumpente caduco folio; quod & in *ſalice* ſuperiùs innuimus.

Luſtravimus hucuſque diverſa foliorum incrementa, quæ paſſim exteriorem *gemmæ* regionem componunt. Et quoniam non ſingula foliola, quibus gemmę integrantur, eandem organizationem & augmentum ſortiuntur, ideo quędam circa hæc monenda veniunt.

In *quercu* 67 igitur, versùs gemmę apicem pręcipuè, unà cùm caducis foliolis *A* ſtabile folium eminet, quod craſſo pediolo *B*, multumque ſucco turgido conſtat, à quo protracta coſtula *C* cum fibris, folii inchoamentum excitat. Idem miramur in *malis perſicis* & *amygdalis*, quarum foliolum craſsâ coſtulâ *D* componitur, adſtantibus caducis foliolis *E* valde gracilibus; & poſtremò in *ulmo* tanta eſt coſtulæ *F* & pedioli *G* craſſities & turgentia, ut nil mirum, ſi caduca foliola *H* minima adſtent.

Foliorum ſitus intra *gemmæ* clauſtra mirabilis pariter eſt; ita enim ipſorum

rum partes contorquentur & complicantur, ut ſibi mutuò adaptata tutò cuſtodiantur & minùs occupent ſpatium.

Ita in *populi* 68 gemmis, ablatis exterioribus integumentis, ſingula ſtabilia foliola geminas ſui partes *A*, contortas & convolutas, versùs ſylveſtrem partem habent, ubi coſtulæ eminent.

In *ſpinaciis* & *lapacio* 69, gemmarum folia *A* miro cuſtodiuntur involucro; ſingula namque membraneo tenuique ſacculo *B* involvuntur, hîc revulſo; geminæ pariter foliorum partes *C*, convolutę versùs exteriorem partem, minori folio *D*, intra proprium ſaccului contento, locum ſupra excurrentem coſtulam *E* parant. Exaratum pariter folium *F*, intra involucrum *D* cuſtoditum, eandem ſuarum partium revolutionem patitur, minuſque foliolum ſuo ſacculo circumdatum ſupra coſtulam cuſtodit; & ita uſque ad minima Natura ludit.

In *beta* 70, gemmæ multiplicibus foliolis conglomerantur; ſingula verò, exteriora versùs, geminas ſui partes *A* complicatas & reflexas habent; contentum autem ſpatium à minori folio *B* conſimili contortum ritu occupatur.

TAB. 14. In *apio* & *ranunculo*, 71 gemmarum folia ſeſe invicem continent, & cuſtodiunt. A radice *A* folium *B* exteriùs erumpit, quod ſui latiori implantatione aliud folium *C* parum ambit; ab hoc ſenſim auctum ſeſe exerit minus folium *D*, quod reflexum intus condebatur: Ab hujus pariter concavo pediolo minimum folium *E* fovetur, quod ulteriùs aliud, non diſpari ritu, continet.

In *fæniculo* 72, analoga foliorum ſituatio ſuccedit; nam à caule, intra folii exortum *A*, gemma *B* ſeu plura foliola invicem conglobata conduntur; lacerato etenim hujuſmodi latibulo folium *C* comatum extrahitur, cujus pediolus *D*, interiora versùs reflexus, aliud foliolum cuſtodit, quod extractum figuram *E* ſervat, intra cujus pedioli clauſtra *F* aliud minimum cubat foliolum.

Gemmarum foliis plura hærent; & præcipuè *pili*, quorum non tantùm ungues, ſed & dorſum cooperiuntur. Ita in *vite* præ cæteris luxuriant oblongi & criſpi, & à caudicis foliis erumpentes reliquum gemmæ cuſtodiunt. In plantis, & præſertim in *farfara*, ex filamentis contextura quædam excitatur, quę adaucti etiam folii latitudinem ita cooperit, ut ſuperinductum indumentum videatur. Cæterùm Pilorum generatio ſuo habebitur loco.

Aliæ inſuper appendices, *fungi*, & *papillæ*, eminent à foliolis intra gemmam contentis. In *Spinaceis* 73, à gemmæ foliolis *A* pendent globuli *B*, cryſtallino humore turgidi. Hi totam foliorum peripheriam tum interiorem tum exteriorem cooperiunt. Variâ conſtant formâ *C*, & pediolo. In una ſpina fungi pariter adſunt rotundo capitulo *D*, gracili aſſurgente pediolo *E*. In *cydonia* pariter *malo* copioſa ſunt vaſcula *F*, à quibus terebinthina *G* extrahitur. In *caſtaneis* hians urnula *H* obſervatur, glutinoſo referta ſucco.

Præter exarata gemmarum integumenta & fulcimenta, alia inſuper in qui-

quibuſdam vegetantibus obſervantur ; peculiares *ſcil. ſucci*, cuſtodiæ gratiâ affuſi : Ita in *populo* lentus quidam ſuccus & flavus luxuriat, quo ſingula foliola ambiuntur, & illinuntur. In *beta, lapacio*, & ſimilibus, circa jam deſcriptas plicas & circumvolutiones glutinoſus & lentus albuminis, ovi inſtar, humor obducitur, quo tota folii latitudo, ſacculo contenta, conſpergitur & madet.

Conſideratis gemmarum foliolis, reliquiſque ab ipſis erumpentibus, occurrit media & profunda ſubſtantia, carinæ inſtar, à qua hinc inde foliola emergunt. Hæc autem tenellum eſt lignum, ſuo cortice circumdatum, fibris ligneis, utriculiſq; medullaribus excitatum, & frequentiſſimè candidis contegitur pilis : Eſt etenim tenellus ſurculus cum futurorum foliorum inchoamentis compendio quaſi concluſum.

Hoc patet in gemma *roboris* & *quercûs* 74, in qua, ſectâ per longum, expanſa obſervatur medulla *A*, quæ ligneis fibris *B* circumambitur ; huic ſuccedit cortex *C* cum elongatis ligneis fibris, qui in gemmæ foliola *D* laciniatur.

Eandem ſtructuram miramur in *ficûs* 75 gemma, quæ per longum ſecta, unà cum extremo ſurculo medullam *A* candidam, utriculis excitatam, exhibet : Non longè ab hac excurrit lignea portio, fibris & fiſtulis *B* contexta, quæ uſque ad apicem producta, propagines *C* in foliorum radices tranſmittit. In medulla, intra gemmam conclusâ ; nodorum rudimenta *D* emergunt. Inter caduca folia *E*, ſtabilia *F* quoque locantur. Ad baſim exaratæ gemmæ ſectus futurus fructus obſervatur, ad cujus exortum medulla *G* elongatur, quæ ligneis fibris *H* circumdatur ; has ambit derivatus cortex *I*, à quo foliola, gemmarum inſtar, tenellum fructum fovent.

Plantarum igitur fœtus, laxatis gemmarum repagulis, turgente alimoniâ augetur in ſpeciem ſurculi, unde internodia elongantur, foliaque auctiora redduntur.

Hujuſmodi incrementum paſſim obſervatur in arboribus, & præcipuè in *caſtaneis* 76, in quibus, emergentibus coſtulis fibroſis, ſtriatus efficitur & plurium angulorum ſurculus ; nam elongatis internodiis *A*, geminum folium caducum *B* erumpit, pediolo folii ſtabilis *C* hærens, ſingulaque pilis & fungis ornantur. Folia itaque ſurculi medietatem tenentia citiùs grandiora redduntur, & quæ baſin gemmæ, vel ipſius apicem tenent, poſtremò adoleſcunt.

Fœcunda Naturæ vis in gubernandis viventium ordinibus eâdem ferè, vel ſaltem analogâ, methodo, perpetuò incedere videtur. *Animalium perfectorum* ſtructuram ab ovo emergentem continuâ auctione, & nutritione ad debitam magnitudinem deducit, agglomeratis novis particulis prioribus & jam præexiſtentibus ; ea tamen ratione, ut in quocunque auctionis ſtatu eadem primæva forma & natura manuteneatur, nullâ emergente de novo animalis parte præter dentes & cornua : In *Inſectis* autem, ultra augmentum, diverſis dicam ætatibus, partes, quarum rudia delineamenta in juventute latitabant, emergunt, qualia ſunt alæ, antennæ, & ſimil. In

Plantis, eadem munificentiâ, quotidianum contingit non tantum augmentum, trunco & ramis ſupercreſcente ligneo involucro; ſed à tenellis ramis novi ſingulo anno erumpunt ſurculi, quorum anticipatum inchoamentum, quaſi peculiaris fœtus dicitur, *gemma*, ſeu *oculus*. Hujus ſtructuram ſuperius luſtravimus in pluribus vegetantium generibus, eamque tenello & minimo ſurculo, à quo hinc inde folia ſquamatìm locata erumpunt, integrari vidmus; unde fœtum ſui generis eſſe, inchoatum *ſcil.* ſurculum ita cuſtoditum, ut ſtato tempore adoleſcat, partes extendantur, & nova progerminet. Et ſicut in *Eruca* partium quarundam delineamenta, adhuc fluida, ſacculis contenta diu jacent, donec intercedente, ſub *aureliæ* forma, quiete, manifeſtiora & ſolidiora emergant; ita *rami* partes in primordiis, gemmæ, quaſi compendio quodam, inſunt; & per annum ita conditæ latitant, donec, accedente vere, laxatis viis ampliores redditæ in ſurculi ſpeciem extendantur. Quare folia, quæ perfecto ſurculo inſervire debent, temporanea ſunt, vel in alienam degenerant formam, ut fusè percurrendo gemmarum augmenta indicavimus. Quæ enim exteriorem gemmarum regionem tenent, non tantùm interioribus & concluſis cuſtodiam parant; ſed contentus ipſorum reliquorumque ſuccus in propriis utriculis excoquitur, & longâ illâ quiete digeritur, donec exaltatus ſpermatico illo ſpiritu, ope ambientis aeris in gemmæ carinam, ſurculum *ſcil.* tenellum revehatur, ut ulteriorem foliorum vegetationem excitet: Unde hujuſmodi gemmarum folia non unicam coſtulam, ut in ſtabilibus foliis ferè ſemper miramur, per medium productam poſſident, ſed multiplices faſciculi, à baſi aſſurgentes, in proprios appenſos utriculos deſinunt. Contabeſcunt poſtremò foliola hæc gemmarum, dum gemina uni adſtant ſtabili folio, exhauſto jam concocto humore; & tandem concidunt, vel gracileſcendo in pedioli formam abſumuntur.

Naturæ pariter methodus in producendis *ſtabilibus* foliis mirabilis eſt. Primò enim coſtula ſeu pediolus, carinæ inſtar, humore turgidus cum appenſis fibrulis manifeſtatur, à quibus probabiliter ſacculorum ſeu utriculorum tranſverſalium membranulæ pendent; ut in animalium primæva delineatione obſervatur. Patent autem deducto novo alimento, quia complicata ſacculorum moles, ſubintrante ſucco, turget, & ita folii latitudinem & laxitatem conciliat.

Gemmarum eruptiones ſtatis locis & temporibus ſuccedunt, ubi *ſcil.* turgens ſuccus copiâ & contento ſpiritu fiſtulas ad latera curvat, & extra derivatur: Unde de novo geminatis ligneis fibris, tracheis & extenſæ medullæ cortex additur, à quo copioſa foliola erumpentia in gemmæ corpuſculum conglobantur. Quare in novellis ramis, & parum elongatis gemmis, novæ pariter emergunt gemmæ, molli cedente fibrarum ſtructurâ, & vegetantis ſpiritus impetu urgente; quin & multum intra luxurians ſuccus extra ſtata tempora, & eruptionis ſitus frequenter gemmas excitat: Sic in detruncatis ramis, vel caudice ipſo, ita ut exiguum trunci à radice aſſurgat, multiplices gemmę erumpunt, quę in *ſtolones* adoleſcunt. Apud noſtrates mos eſt, ut roſarum frutices poſt florum eruptionem abſcindantur,

ſcindantur, ut indè novę ſuborte, gemmę citò in ramos excreſcant, & proximo autumno flores emittant; copioſus namque & excoctus in tranſverſalibus utriculis ſuccus, cùm in reciſi trunci & ramorum vegetationem non abſumatur, obturatis exſiccatione fiſtulis, non digeritur, ſed deorſum concidit, & novo urgente ſucco, neceſſariò ad latera factâ viâ, in novas ſoboles congeſtus digeritur; quare arbitrio culturæ in arboribus & quibuſdam plantis derivatur & flectitur alimentum, novęque emergunt partes.

Tanta gemmarum luxuries, quę in arboribus in ramos cedit, & in herbis caulium germinationem promovet, fœcunditatis gratiâ inſtitui videtur. Ab his namque ſpermatica vaſa, uteri *ſcil.* ſeu ovarium, cum appenſis ovis, quę ſemina dicuntur, pendent, & ſua incrementa ſuſcipiunt: Quare ſicut in animalibus à toto videntur particulę decidere, ut in corpuſculum dirigantur & conglobentur; ita ſingulo anno à quibuſcunque tenellis ramis novę emergunt partes, à quibus excoquitur & derivatur non tantùm ſeminum materia, ſed & ſpermatica organa: Non enim idem uterus perpetuò viget, & reliquo inſervit vegetanti corpori, cui appenditur, ſed ſingulus quique ramus anno, quo luce fruitur, propriis gaudet ſpermaticis organis, & fœcundus brevi viget; reliquum verò ſuę vitę infœcundum tranſigitur.

Inteſtina fermentatio, continuata ferè per annum, in gemmis, plurium inutilium promovet excluſionem; quę vel utriculis expoſitis effuſa terebinthinę naturam ſapiunt, vel aqueę ſubſtantię modum æmulantia propriis ſacculis detinentur, tandemque evaneſcendo obliterantur; quin & ſuccus, quibus foliorum latitudo oblinitur in *populo*, & *lapacio*, circa ipſa denſari, ex perpetuo effluvio probabile eſt. Idem etiam de pilis philoſophandum videtur; hi enim ut plurimum, deficiente contento olim humore, exſiccati contabeſcunt & decidunt.

De

De FOLIIS.

FOliorum copiam, quorum vegetationem ſuperiùs indicavimus, à tenellis ſurculis pendere omnibus patet. Sunt autem hæc quaſi *placentulæ* ſingularum partium, quibus plantæ integrantur, compendio coagmentatę. In his moliendis tam ferax eſt Natura, ut foliorum gratiâ plantæ vegetare videantur. Vario ſitu & ordine implantantur folia in ſurculis, & adauctis gemmis: Frequenter enim in arboribus alternatim erumpunt; ita miramur in *populo*, *lauro*, *avellanis*, *limoniis malis*, *rubo canino*, *caſtaneis*, & *jujubis*: In his quandoque folia numero viginti tria pendent alternâ eruptione, & quæ mediam ſurculi regionem occupant, auctiora & laxiora ſunt, reliqua minora. Folia alternatim etiam erumpentia non determinatum occupant ſitum, ita ut ductę geminę lineę rectę per latera ſurculi à baſi ad apicem omnia contangant, ſed vario ordine locantur; ita tamen, ut in aliquibus tertia quæque eruptio ſub eadem directione adſit; in aliis autem, ut in *quercu*, ubi copioſa prodeunt ab oblongo ſurculo folia, rectitudinem ſymmetricam difficulter invenimus. In *Cinaræ* caule, coſtulę, quibus ligneę fibrę cuſtodiuntur, taliter à penitiori caulis corpore emergunt, & producta tandem in folii pediculum abſumuntur, ut cuique facilè innoteſcat, folia fieri emergentibus ſenſim coſtulis & fibris à profundo caule & caudice: Nam folii pediolus congeries eſt coſtularum & fiſtularum, quarum portio ſupra proximum folium emergit, & caulis exteriorem excitat regionem; reliqui verò fibroſi faſciculi longiùs emergunt.

TAB. 15. Ita in *malis limoniis* & *aurantiis* 77, obtuſis quibuſdam eminentiis ſtriatus efficitur tenellus ſurculus; ipſius enim ſegmentum angulare corpus *A* deſignat; fibrarum faſciculi, qui in folia elongari debent, ſenſim à ligneo cylindro eminent ſupra folium *B*, & rectà producti, ſuperatis quatuor foliis *C*, tandem in pediculum *D* abſumuntur, & ita fit in ſingulis.

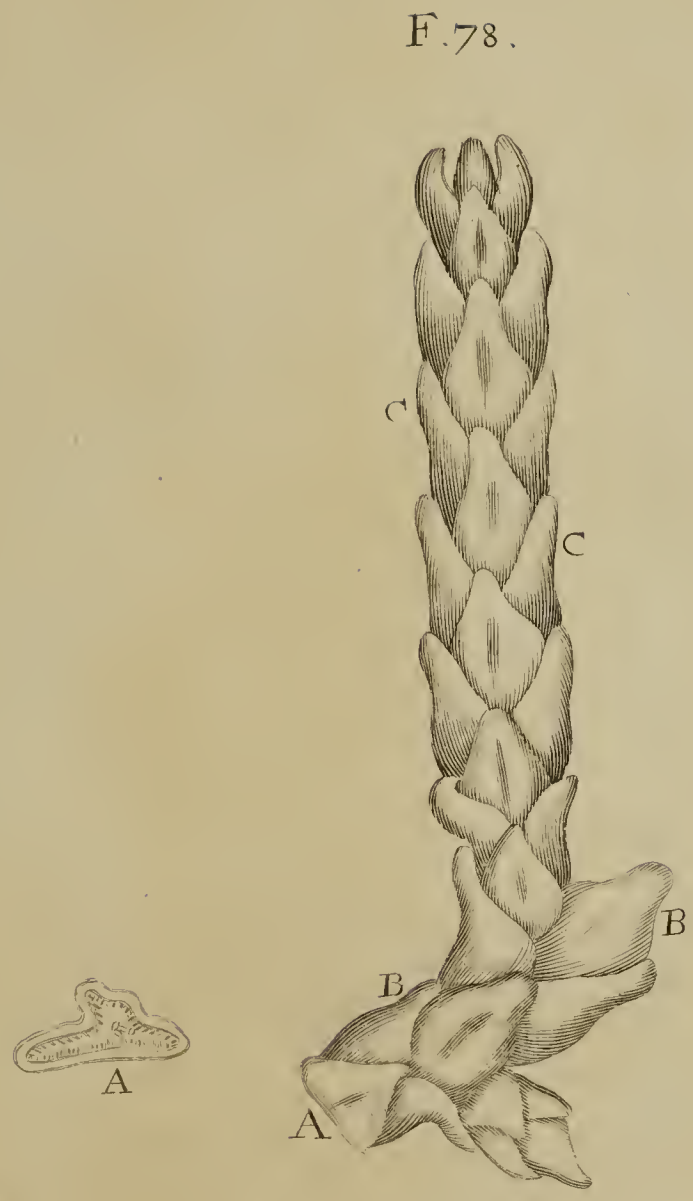
Tam variè configurantur folia in ſingulis vegetantibus, tamque diſpari magnitudine donantur, ut impoſſibile ſit ad certas normas ſingula reducere: Principalioribus tamen contentus, quaſdam exponam foliorum formas, non ut genera plantarum tot caracteribus diſtincta conſtituam, ſed ut rudis notitia, facilioris intelligentiæ gratiâ, habeatur; ideò ab univerſali vegetantium ordine quædam ſeligam.

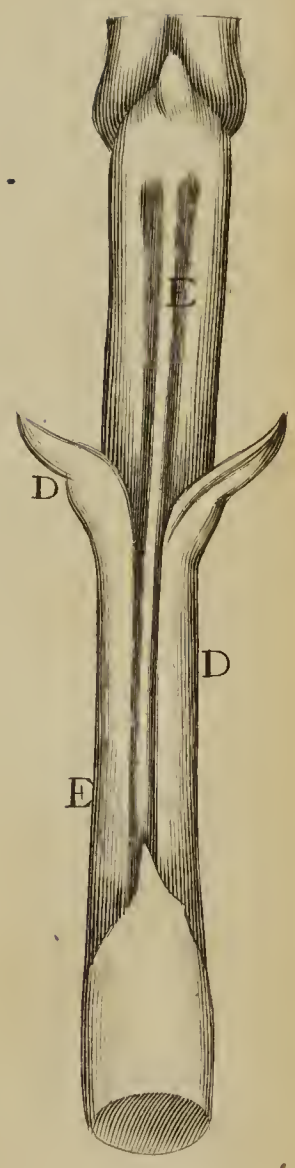
Minima itaque & ſimpliciſſima eſt forma in *cupreſſo* 78, cujus foliola, licèt ſeparata nequaquam pendeant, ſurculis tamen hærent, & veram foliorum referunt naturam; à ramo enim *A* erumpunt folia *B* craſſa & viridia latiori exortu & obtuſo apice; ſurculus pariter emergens hinc inde foliis *C* contegitur. Ligni ſubjecta ſubſtantia parum elongatur, gemmarum inſtar, & foliola *D* parum excreſcunt, & loco petioli, coſtularum tumores *E*, à ſurculo emergentes, habent. Supra exarata foliola ſtatis locis nova manifeſtatur gemma, quę parem ſortitur progreſſum.

In

F. 77.

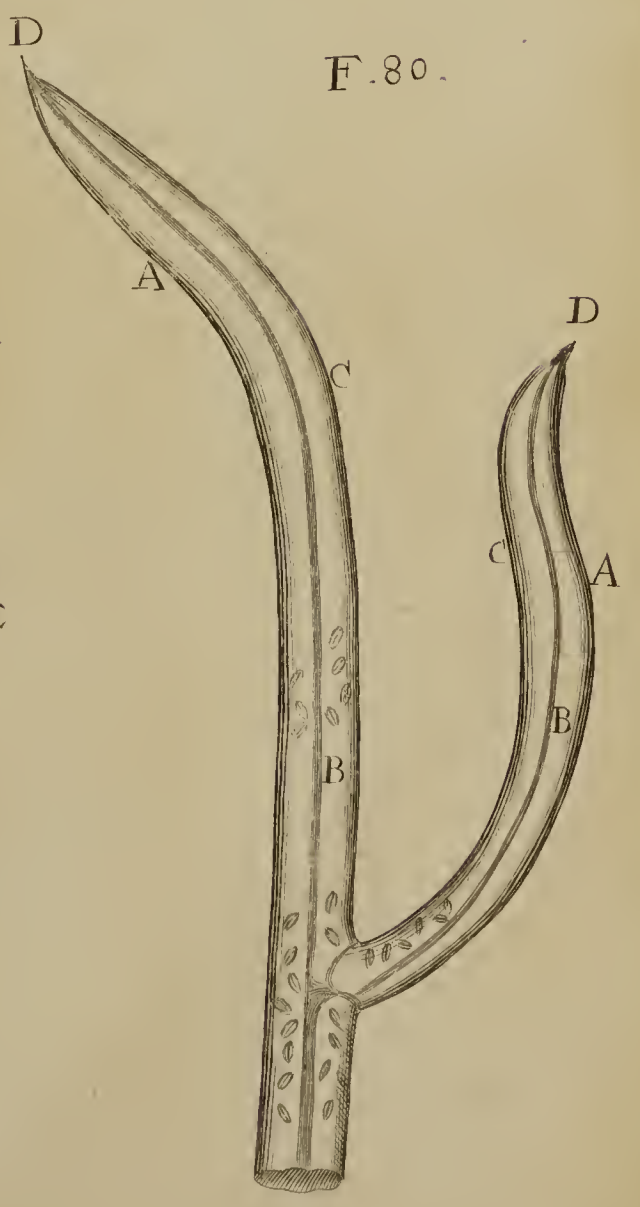
F. 78.



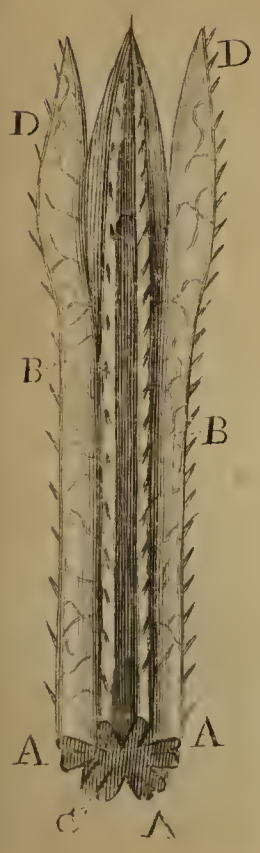


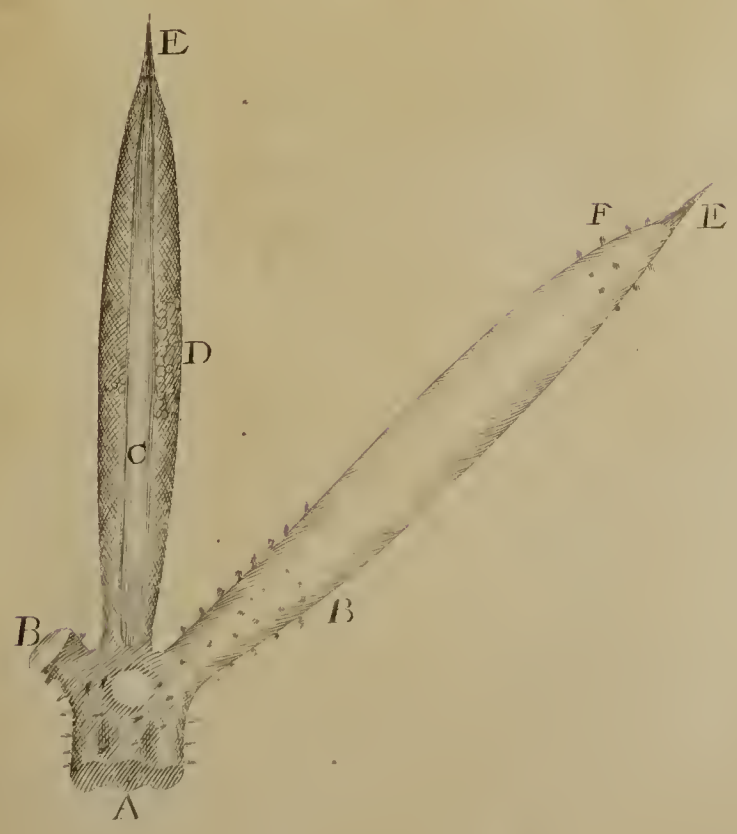
F. 80.

F. 81.



F. 79.

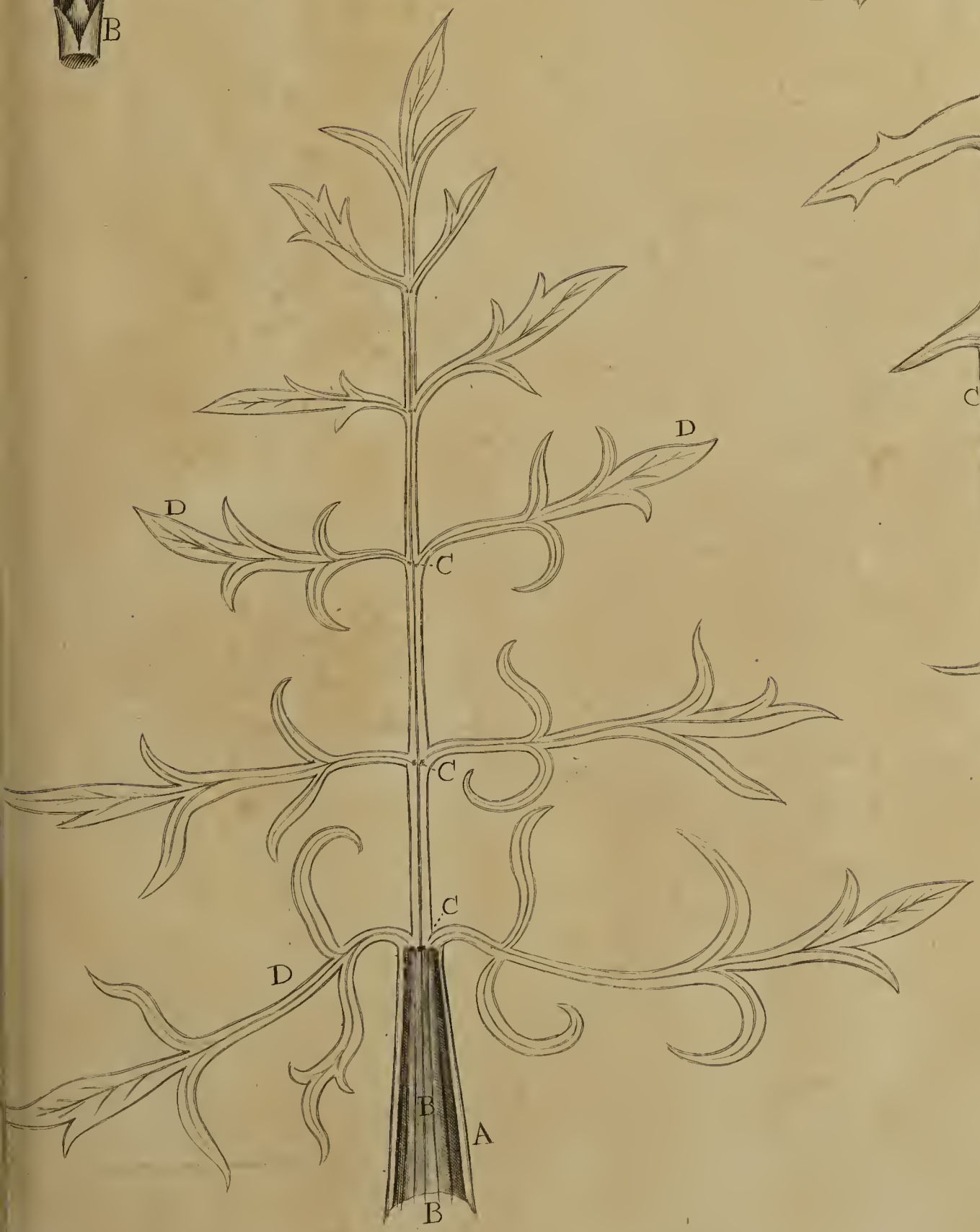




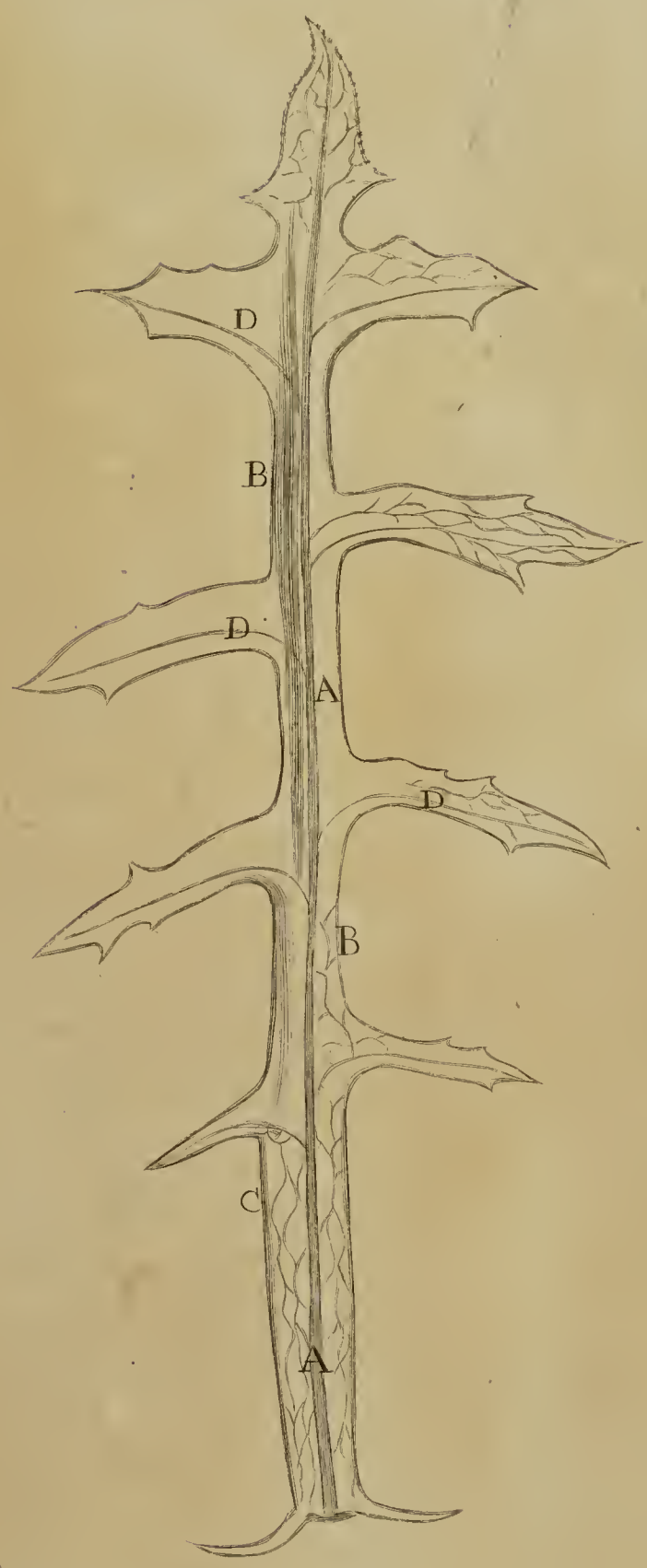
F.82.

F.83.

F.84.



F.85.



In *cauda equina* 79, articulati ſunt rami, multiplicibus emergentibus nodis, unde folii compages talis eſt: Quinque itaque conſtat appendicibus *A*, quæ exiguam poſſidentes latitudinem, utriculis & fibris *B* integrantur, coloreque pollent viridi. Singula folii appendix, excurrente ſurculo, in geminas dividitur partes *C*, quarum extremi ungues ſpinis *D* muniuntur.

In *fœniculo* 80, licèt tota erumpentium ramorum moles videatur folium conſtituere, extremitas tamen in gracillima corpora ſoluta deſinens, foliola, vel ſaltem ipſis analoga, æmulatur: Hæc à lateribus minora profert foliola *A* quaſi ramos; per medium horum lignea coſtula *B*, ſeu fiſtularum & trachearum faſciculus, excurrit; hinc inde viridis excreſcit quædam ſubſtantia *C*, utriculis coagmentata, quæ cylindricum corpus efficit, quod in ſtylum ſeu ſpinam *D* deſinit.

Eadem ſtructura, manifeſtior tamen, occurrit in *aſparago* 81, à cujus tenello ramo *A*, multiplicia folia *B* emergunt; horum forma ad ovalem tendit; pervaduntur excurrente fibroſo faſciculo *C*, à quo utriculi *D* pendent: Horum apex ſpinâ *E* armatur, reliquum verò papillis *F* ornatur.

In *Pino* 82 oblongius eſt folium; gemina autem erumpunt *A*, à ſurculo, cui adhuc hærent gemmæ foliola *B*; hæc parum lata, interiora versùs concava ſunt, & in ungue ſpinas *C* promunt. TAB. 16.

In *camomillæ* 83 folio, circa excurrentem faſciculum *A*, exiguę utriculorum moles *B* hinc inde pendent, ut quaſi foliola vel appendices *C* deſignentur. Eundem progreſſum miramur in *abſynthio*.

In *paſtinaca erratica* 84, folium, quod lato exortu *A* alternatim promitur, plures in pediculo continet fibrarum coſtulas *B*, quæ in nodo *C* unitæ diverſas appendices vel nova quaſi folia *D* excitant, exiguâ utriculorum ſtipata compage.

In *cichorio* & *ſoncho* 85, circa excurrentem fibrarum coſtulam *A*, utriculorum portiones locantur, unde parum laxata folii ſubſtantia *B* appenditur, quæ fibroſo reti *C* irrigatur. Fibrarum quoque rami *D* elongatis utriculorum ſeriebus ambiuntur; unde minùs profunda ſunt intercepta ſpatia.

Quercus & *filipendulæ* 86 folium, elongatis à coſtulis *A* utriculorum ordinibus, amplius redditur, & ſubſtantia ejus minùs laciniata *B*. In *piris*, *pomis*, & pene innumeris, ita continua redditur folii latitudo, ut minimæ tantum ſuperſint inciſuræ. TAB. 17.

Hujus ſpeciem miramur in *roſis* 87, quarum media coſtula *A* ramos *B* promit, ſibi invicem occurrentes; exterior verò unguis minimis inciſuris *C* exaſperatur, ita ut ſerratus fiat.

In *mali medicæ* & *limoniæ* 88 foliis, minimarum crenarum veſtigia ſuperſunt; exterior namque unguis *A* Zonâ quaſi diaphanâ ambitur, & frequentem patitur inciſuram *B*, cui proxima adſtat, perpetuò conſpicua, olei veſicula, ſeu utriculus *C*; hujus conſimiles *D* quamplurimi, folii latitudinem occupant.

In *sempervivo* & *buxo* 89, tam ferax est utriculorum copia, ut crassum reddatur folium; cujus exterior ambitus *A* continuus, nullis solvitur crenis; interiùs fibroso reti *B*: Irrigatur hinc inde utriculis, & globoso reti componitur.

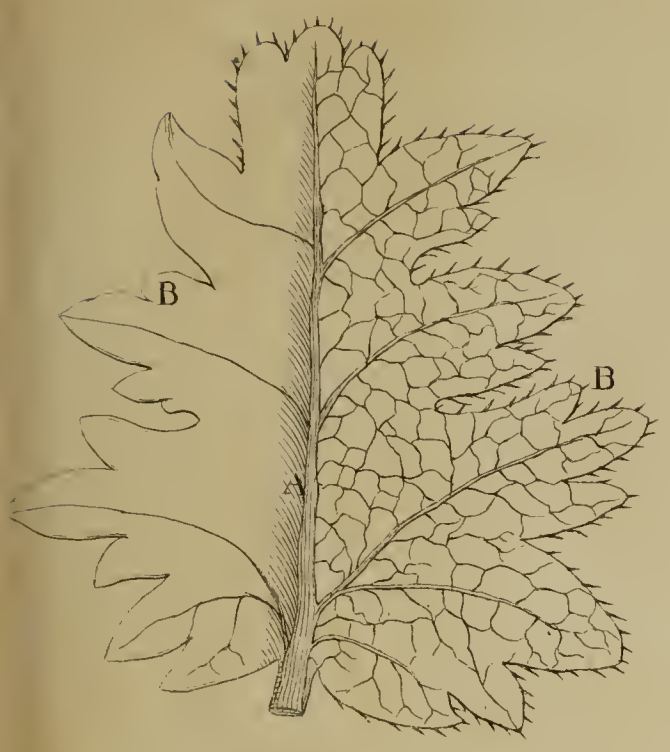
Longus nimis essem, si universales etiam foliorum formas cursim exponere tentarem; quodlibet enim plantarum genus sua peculiari gaudet foliorum specie, unde quædam folia angulosa, mucronata, ensiformia, & aculeata observantur; aliqua verò rotunda, triangularia, falcata, & crenata occurrunt; non-nulla cava, fistulosa, carinata, & sinuosa conformantur; & tam variè Natura ludit in foliorum forma, ut perpetuum hominibus paraverit spectaculum.

Folia pluribus integrantur partibus, quarum historiam fas est aggredi; & primò *petiolus*, seu pediculus occurrit, qui in plerisq; diversâ constat magnitudine. Enascitur autem à tenello surculo & nunquam ab antiquioribus ramis & trunco ipso, nisi medio gemmæ surculo. Hujus exortus ab intimioribus ligni fistulis, ad extra continuatâ substantiâ derivatis, secto surculo patet, & præcipuè in *lauro* 90; à cujus fibrosa portione *A* ligneus pediculi cylindrus *B* exoritur, & in folium *C* absumitur. In *vite* & similibus 91, manifestior & elegantior est pediculi implantatio, seu eruptio. In nodo enim plures fibrarum fasciculi *A* ab interiori emergunt ligno, & in fasciculum recollecti, pediculum oblongum *B* efformant, iterumque laxati, folii reliquum explent: Implicantur autem hujusmodi fibræ reticulari opere antequam pediculum excitent, ut mos est naturæ: Ita in *ficu* 92, undecim interdum fibrarum fasciculi *A* invicem reticulariter inosculati petiolum *B*, hoc est, ligneum cylindrum, medullam *C* ambientem, efficiunt. In plantis quibusdam, ubi folia petiolis destituuntur, vel saltem ipsi in cylindrum non coarctantur, fibrarum implicatio novaq; germinatio succedit, acsi nodus intercederet; ita *in tritico*, & consimilibus 93, in singulorum foliorum *A* exortu, ligneárum fibrarum reticulare opus *B* miramur, quod nudis etiam oculis levi tumore emergens patet. Mirabilior in *gramine*, *arundine*, & *grano turcico* 94, est fibrarum structura; portio, quæ pediculi vices supplet, minori fibrarum *A* copiâ pollet; ubi autem parum flectitur & obliquatur, plures & plures promuntur fibrarum soboles, & novi surculi *B*, & circumlocati utriculi diverso inficiuntur colore quasi nova constituatur pars, nodo analoga, reliquum verò elongatæ substantiæ *C* in folium laxatur.

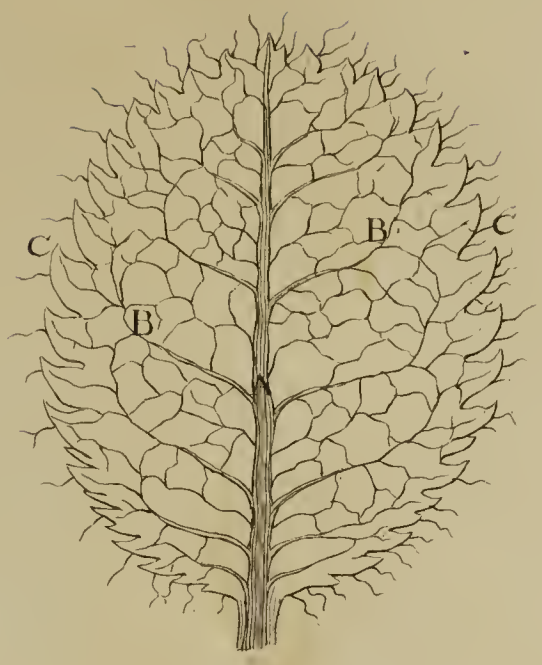
TAB. 18.

Descriptus petiolus (ut in lustratis foliis contemplati sumus) veluti peculiaris caudex in ramos & surculos scinditur. Frequenter per longum excurrens sub costulæ specie hinc inde promit ramulos, qui tandem in rete desinunt. Hoc passim in foliis patet, & præcipuè, in *blito albo majori* 95. cujus petiolus *A* latus & crassus solvitur in costulas *B*, quæ reticularem plexum excitantes, folii latitudinem excurrunt. In aliis autem foliis petiolus statim ac latitudinem attingit scinditur in minores ramos, conspicuos tamen, qui quasi ab uno exorti umbilico, alios minores pro-

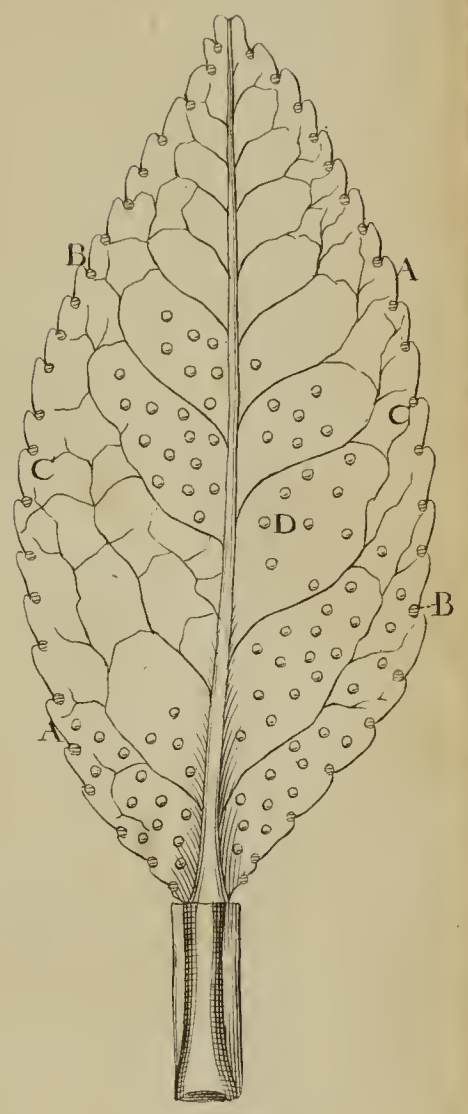
F. 86.



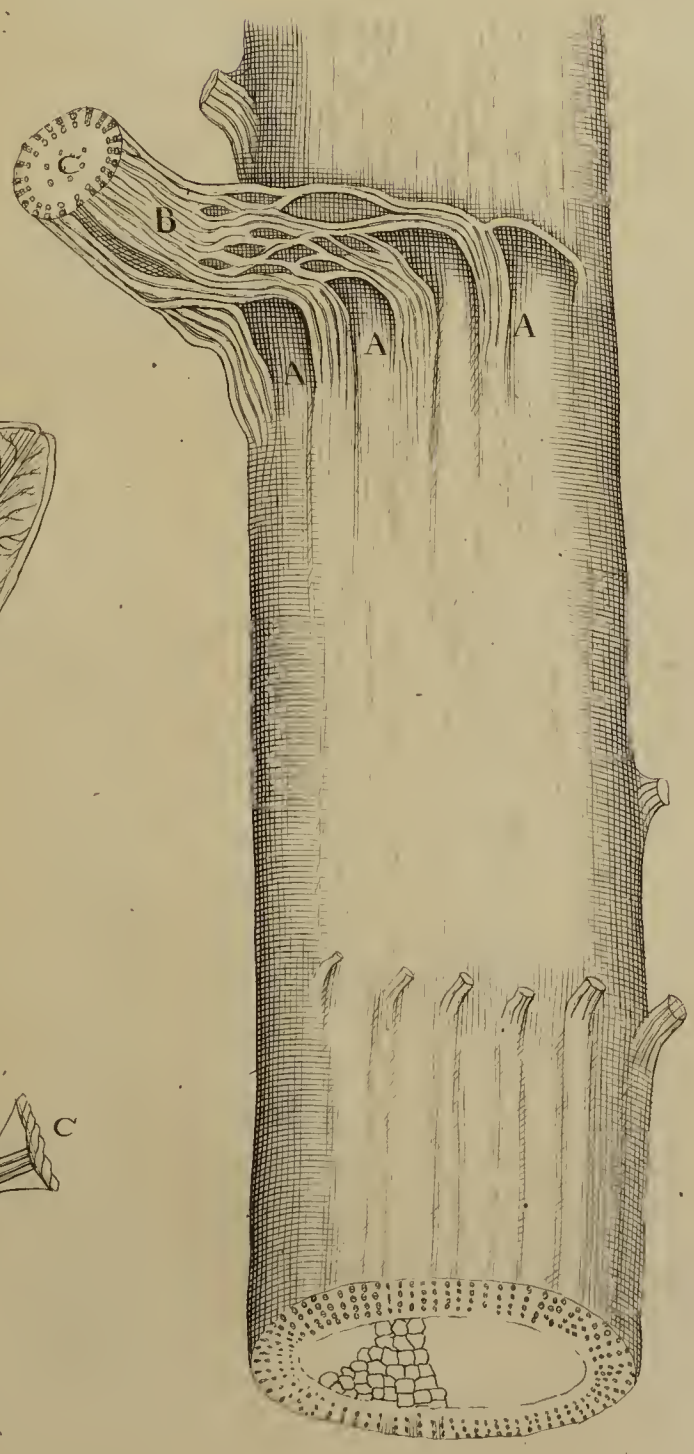
F. 87.



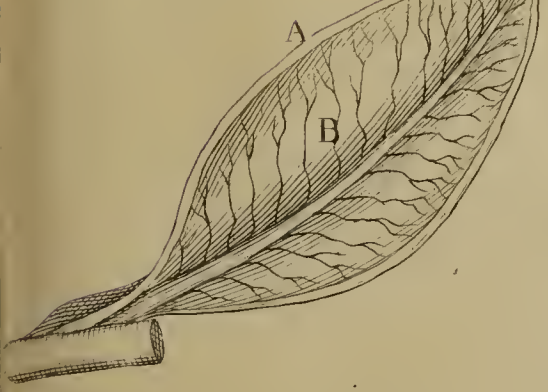
F. 88.



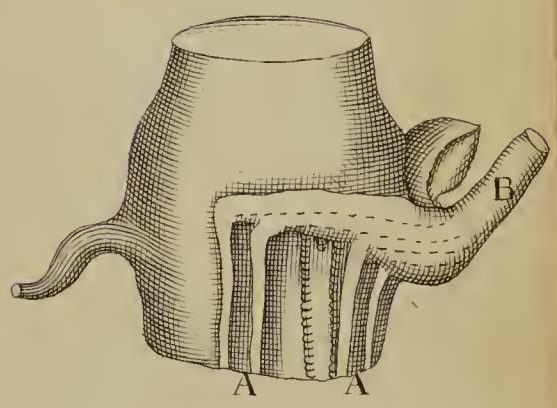
F. 92.



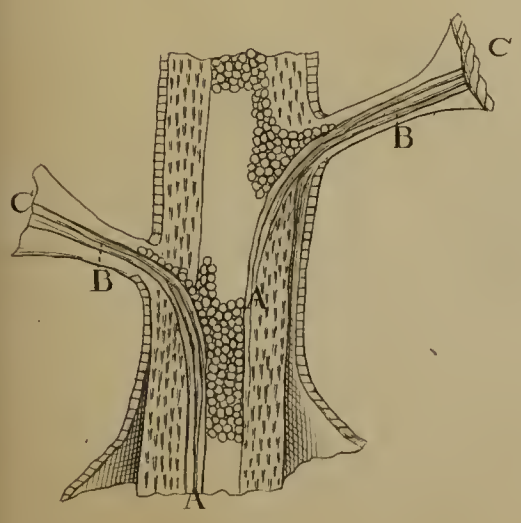
F. 89.



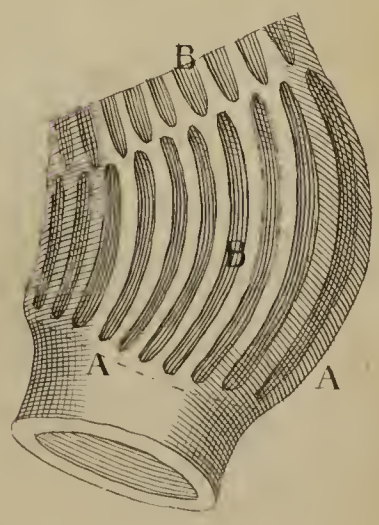
F. 91.



F. 90.

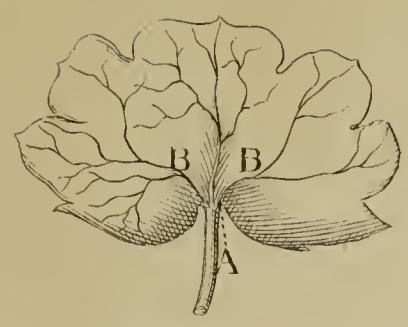


F. 93.



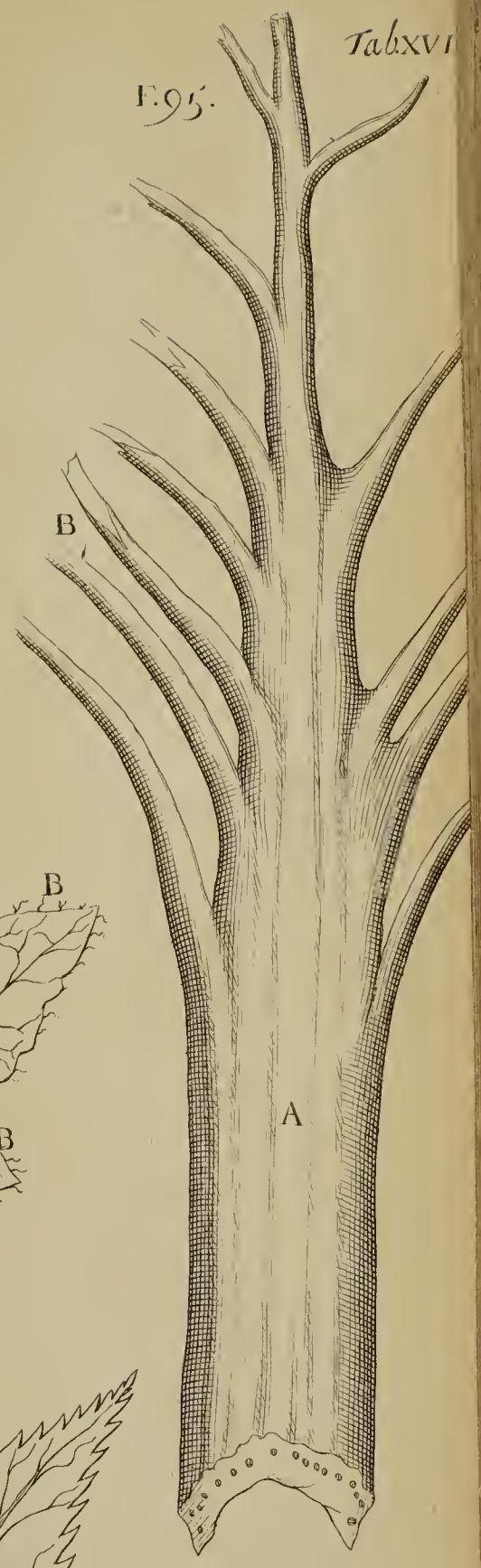
F.94.

F.96.

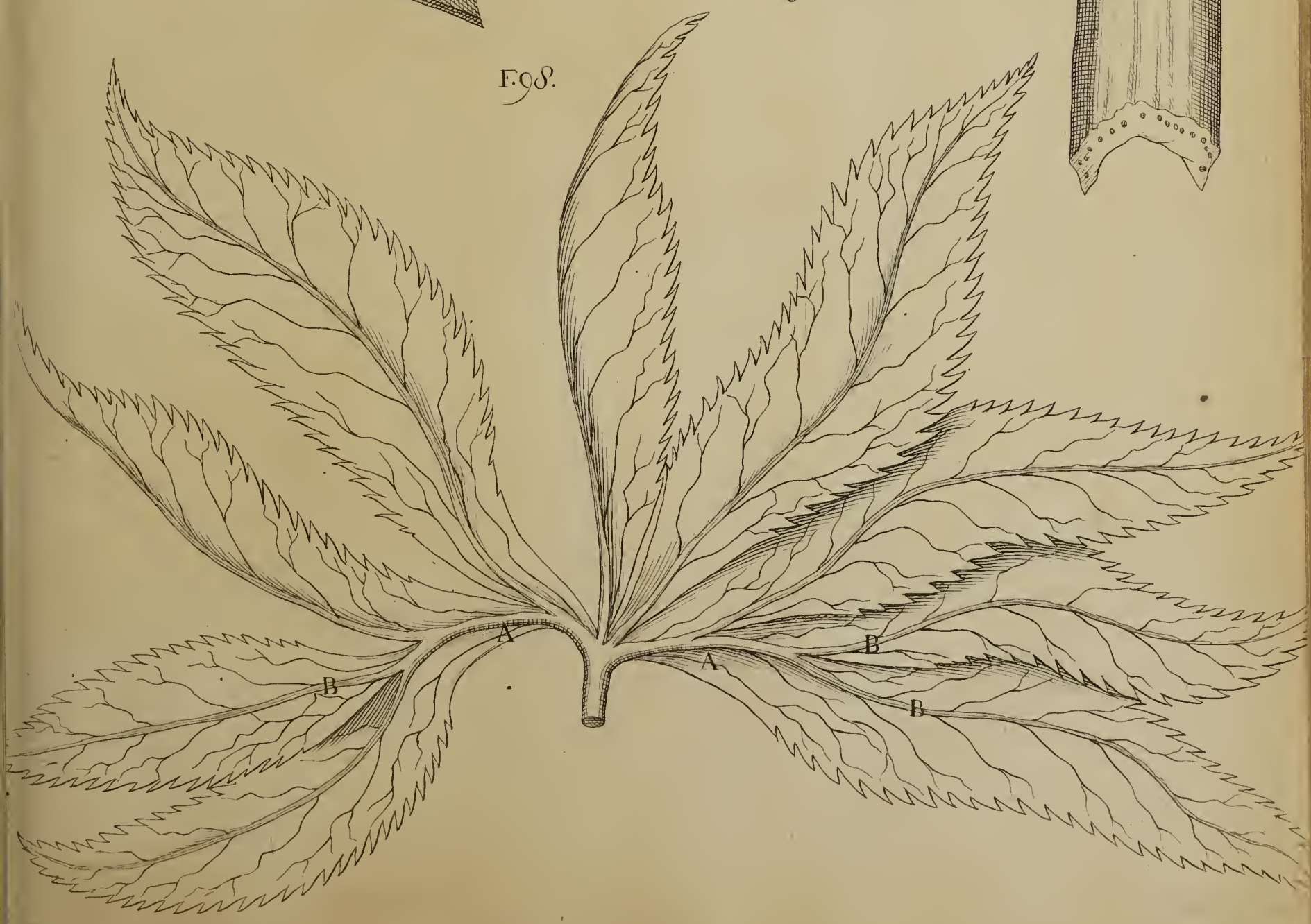


F.97.

F.95.

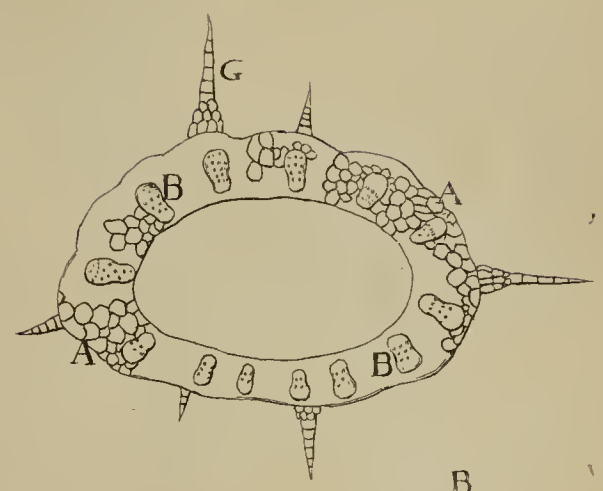


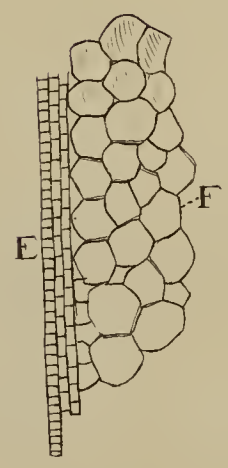
F.98.



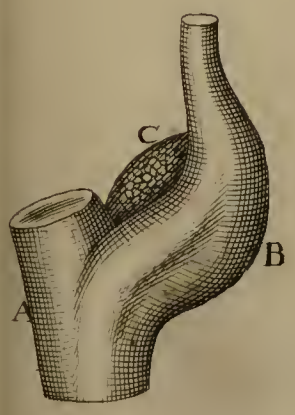
F.99

F.100.

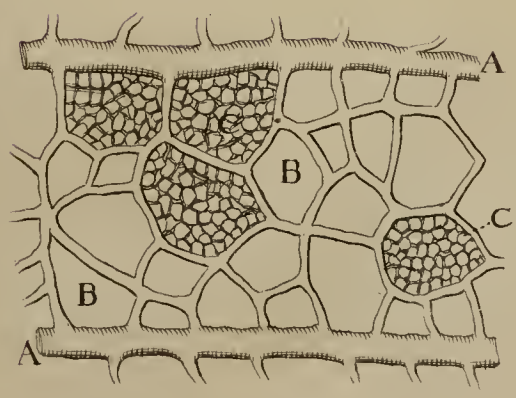




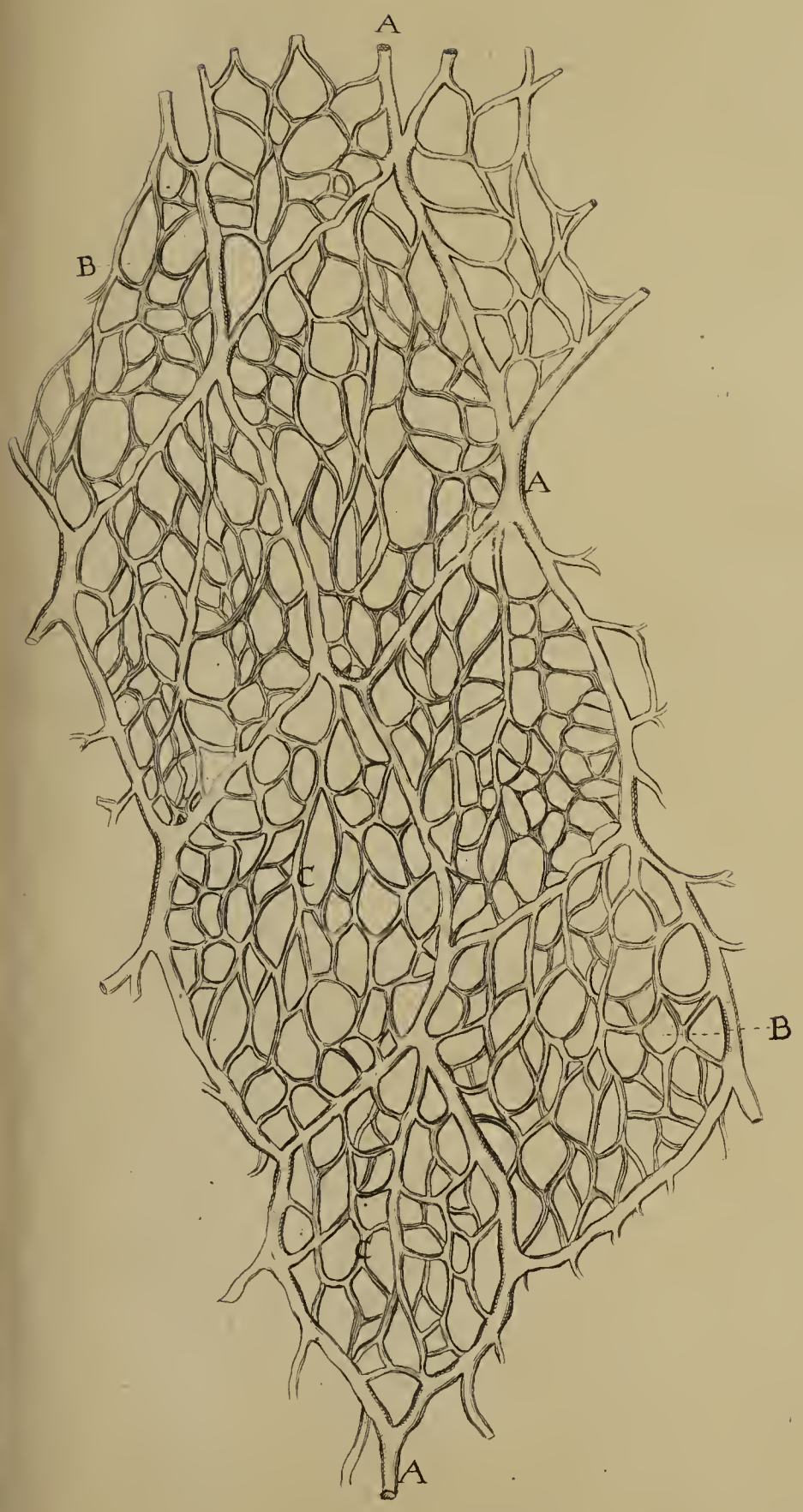
F.101.



F.102.



F. 103.



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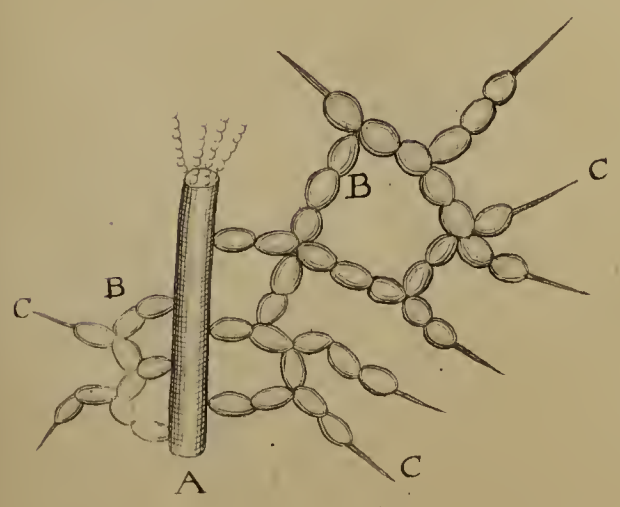

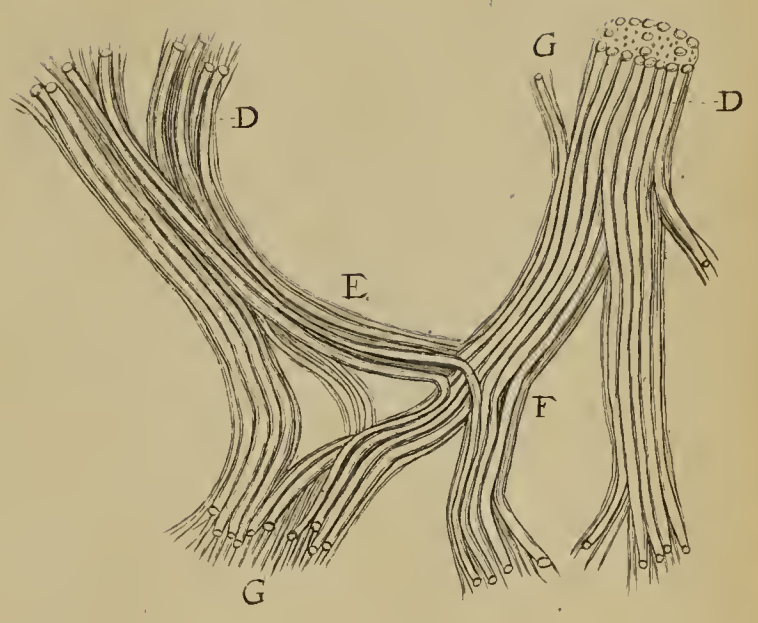

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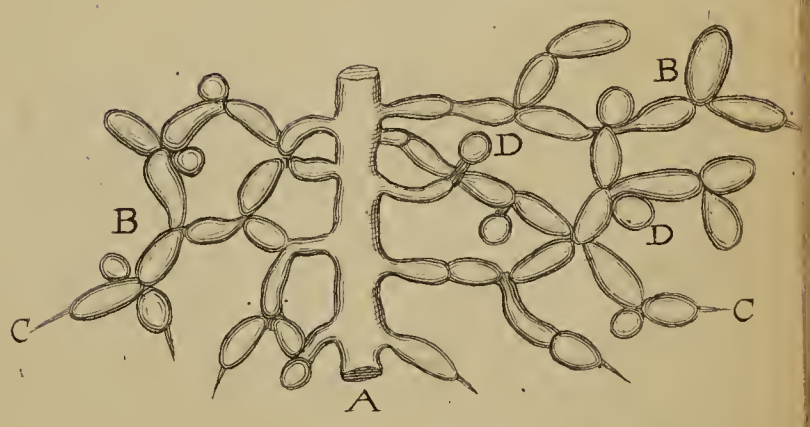

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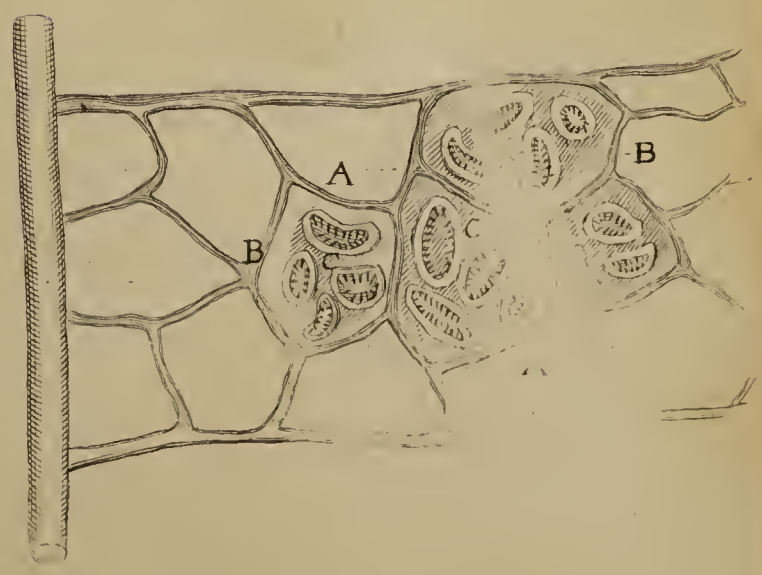


producunt. Hoc accidit in *hædera*, & *cimbalaria* 96, cujus folium petiolo firmatur, qui in inſertione *A* ſolvitur in tres conſpicuos ſurculos *B*, undè folii latitudo non multùm profundis inciſuris ſolvitur. Idem in *opio* ſeu *acere minori* 97, cujus pediculus quinque aſſurgentes progignit coſtulas *A*, totidem folii appendices *B* irrigantes, profundis intercedentibus inciſuris. *Hellebori nigri* 98 pediculus inſignes edit quaſi ramos *A*, qui ulteriùs & ipſi novas emittunt ſoboles *B*: Folium hoc ita profundè ſolvitur, ut neſcias, an unicum ſit folium ita laciniatum, an ſingularia folia totidem ramis correſpondentia. In *nuce*, *roſis*, *vite alba*, & *jaſmino* 99, oblongus eſt pediculus *A*, à quo hinc inde diſparata folia *B* pendent, brevi & ipſa firmata petiolo *C*. Varius eſt foliorum *B* numerus; quæ enim à ſurculi baſe emergunt, pauciora ſunt, cùm ternarium frequenter non excedant numerum; circa medium tamen & apicem, novem interdum numerantur foliola *B*. TAB. 19.

Expoſitus petiolus eſt quaſi compendium caulis ſeu caudicis, eaſdem ſortitus partes, quæ in trunco & ramis deprehenduntur. In *cucurbita* 100, proceræ magnitudinis extat; concavus eſt, unde ipſius ſegmentum talem exhibet ſpeciem. Sub cuticula varii utriculorum ordines *A* locantur; in horum medio hiant coſtulæ ſeu fibroſi faſciculi *B*, quorum media pars tracheis *C* componitur, externæ verò *D* ligneis fibris complentur: Hæ per longum ducuntur, & hiantibus quaſi fiſtularum *E* fragmentis coagmentantur, ipſiſque utriculi *F* variè configurati hærent; exteriùs ſpinæ *G* prominent, variis nodis excitatæ. In pluribus arboribus, & præcipuè in *nuce* 101, à tenello ſurculo *A* craſſus valde & latus emergit petiolus *B*, amentum *C* axillâ cuſtodiens. Hujus ſegmentum medullares utriculos *D* in centro exhibet, circa quos lignea portio *E*, fiſtulis & tracheis conſtans, obducitur; hæc corticis fibris, & utriculis *F* ambitur.

Petiolo appenditur dilatata folii portio, cujus præcipuas formas brevi percurrimus; unde fas eſt, ut ipſorum ſubſtantiam & compagem indagemus. Præcipua itaq; dilatati folii pars occupatur à coſtulis vario ritu productis; fibræ etenim ligneæ, unà cum tracheis & peculiari vaſe conglomeratæ, à petiolo excedentes veluti minima arbor hinc inde diſperguntur & ſolvuntur in ramulos, qui & ipſi denuò novos ulteriori diviſione promunt reticulares plexus. Emergunt hujuſmodi faſciculi in pleriſque foliis conſumptâ utraque cuticulâ, præcipuè in *quercu*, & *hedera*. Placuit tamen minimas areas obſervare in *oleandro* 102, cujus detractâ cuticulâ, inſigniores rami *A* à coſtula per medium excurrente lateraliter erumpunt, qui productis ramulis reticulariter implicitis, diverſarum figurarum areas *B* efficiunt, quæ ulteriùs minimè fibroſo emergente reti *C*. replentur. Elegantior reticularis plexus in *opuntiæ* 103 foliis occurrit, conſumptâ carne, unde placuit fruſtulum delineare, prout ruditer apparet. A nodo igitur ſeu quaſi folii petiolo plures emergunt fibrarum faſciculi, ſeu coſtulæ *A*, quæ per longum excurrentes obliquè inſigniores areas *B* efformant, quæ à productis ulteriùs fibroſis ramificationibus minores areas *C* efformant, in quibus nova pariter ſuccedente fructificatione, TAB. 20.

in

inconſpicuæ penè excitantur areæ. Sunt autem plures hujuſmodi ſuperpoſitæ productiones, quibus folium integratur. Quælibet itaq; coſtula fibris, tracheis, & fortaſſe peculiari vaſe, coagmentatur; plerumq; tracheæ *D* exteriorem occupant locum, nonnullis intrò concluſis; hæ obliquantur, & relictâ coſtulâ *E* alteri *F* inſeruntur, & ita frequentes fiunt areæ, noviq; faſciculi. Probabile etenim eſt, ligneas fibras, & tracheas, à primordiis quaſi in faſciculum recollectas, ſeparari; indeq; diverſas areas fieri ex ſubortis identidem utriculorum appendicibus, quæ contento ſucco turgidæ & auctæ, neceſſariò fibras, quibus continuantur, lateraliter urgent. Reliquum coſtulæ fibris & fiſtulis ligneis *G*, pari productione implicitis, completur, quorum ora evidenter patent.

Fiſtulas & tracheas concomitantur peculiaria vaſa, quæ concoctum ſuccum continent; hæc ſolâ humoris eruptione patent, quatenus ſcil. vel alieno pollent colore, vel craſſiori ſcatent corporaturâ; unde ſectis foliis *tithymali*, *cichorii*, & ſim. lac emergit; in *chelidonio*, ſubluteus humor; in reliquis autem herbarum & arborum foliis, quia aquoſus humor eſt, ideo nullam ſui exhibent notam.

Foliorum coſtulas reticulariter per totam latitudinem produci, indeque multiplices ſubortas areas vidimus; hæ autem utriculorum ſeriebus replentur ab emanantibus coſtulis, & quaſi ab ipſis pendentibus; unde foliorum craſſities conſurgit. Hoc licèt in ſingulis diligenter luſtratis foliis pateat; in craſſioribus tamen minùs obſcurè ſe ſe offert, ut in *portulaca*, *buxo*, *ſempervivo*, & *telephio* 104: In hoc etenim, laceratâ cuticulâ, dum ſenſim coſtulæ *A* evelluntur, appenſæ utriculorum ſeries *B* reticulariter implicitæ rapiuntur, quibus tota folii latitudo & craſſities excitatur: Sunt autem utriculi ovalis figuræ, & inæqualis etiam, invicem contigui, tunicâq; in modum veſicæ laxatâ componuntur, quæ ligneam fibram & tracheam *C*, ſecundùm longitudinem ſui centrum excurrentem, amplexatur, ipſiq; hæret; unde laceratione utriculi frequenter manifeſtantur. Eandem configurationem evidentius in craſſiori *opuntiæ* folio 105 deprehendimus, à cujus coſtula *A* molles pendent utriculorum ordines *B*, oblongiori conſtantes formâ, & reticulariter impliciti, à quorum medio, laceratione prævia, lignea emergit fibra *C*. In ejuſdem exſiccato folio, & tabe conſumpto, plurium utriculorum veſtigia adhuc ſuperſunt; magis tamen conſpicua occurrunt quædam ſubalba corpora *D*, quorum in vireſcentibus veſtigium apparet: Hæc ſolidioris ſubſtantiæ ſunt; & quaſi angularibus appendicibus *E* contexta. Interdum dubitavi, an peculiaris ſucci extent receptacula, vel ſaltem tartarizato ſucco concreti utriculi, ut *pirorum*, *cydoniorumq; malorum* pericarpio accidit. Expoſiti foliorum utriculi, ex contenti ſucci natura, mutuâ compreſſione, vel laxitate, varias ſubeunt in exteriori regione formas; unde quaſi cæcales & vermiculares veſiculæ contortæ apparent: Interdum angulis ſcatent, & frequenter irregulariter terminantur.

Inter utriculos & fibroſum rete, in pleriſq; foliis peculiares folliculi ſeu loculi diſperguntur, qui patenti hiatu foras, vel halitum, vel humorem fundunt.

fundunt. Hujuſmodi hiatus evidentius præ cæteris patet in foliis *oleandri* 106 : In ſingulis hujus areis *A*, à fibroſis coſtulis *B* excitatis, quatuor, vel plura aperiuntur folliculorum ora *C*, patenti hiatu, qui circumducto labio, pilis conſperſo, ambitur ; intus concameratio ſuccedit concavo & globoſo excitato corpore. In *populo*, *caſtanea*, & *moro* 107, dum foliorum utriculi contabeſcere incipiunt, magis eminent hujuſmodi loculi : A fibra etenim inſigniori *A* emergentes coſtulæ *B*, areas efformant, quæ ramulis *C* ulteriùs irrigantur, hiſq; hærent exarati loculi *D*, rotundæ ſolidæq; ſubſtantiæ ; patenti donantur hiatu, qui manifeſtatur in parte interiore folii, qua ſcil. cœlum reſpicit. In hac diverſæ utriculorum coronæ *E* circumlocantur, unde frequenter concha *F* excitatur ; ab hac lentus fluiduſq; interdum effluit humor, quaſi ſudor. In *oleæ* 108 foliis, in exteriori ſcil. parte, perſimilis locatur ſtructura ; frequentes namq; coronæ adſtant, oblongis excitatæ ſacculis *A*, contentum verò centrum à papillari corpore *B*, parum protuberante, occupatur : Ab hac autem effluit argenteus icor, qui folii contiguis partibus hærens, eaſdem lucidas reddit. In *ficu* 109, copioſiſſima ſunt hujuſmodi globoſa corpora *A* in areis diſperſa, quæ diaphano ſucco turgent : Eminent autem parum in exteriori parte folii, & exiguo hiant foramine. Eandem pariter ſpeciem miramur in *citro*, *malo aurantia*, & *limonia*. TAB. 21.

Tota exaratorum moles, quibus folia coagmentantur, levi ſuperextenſâ cuticulâ ſeu epidermide obducitur, quæ ſubjectorum colorem refert, ipſaq; contenta cuſtodit, & continet. Plerumq; levibus ſpinis & pilis cooperiuntur folia, quorum indaginem ſuo loco habebimus.

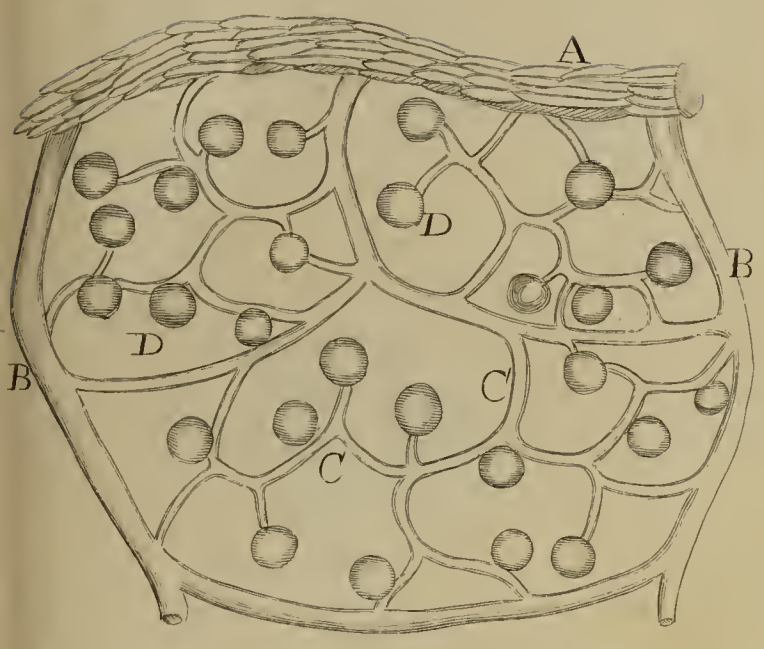
Foliorum extremus unguis, quaſi Zonâ ſeu craſſiori lineâ circundatur. Diu quæſivi, cujuſnam naturæ ſit : In aliquibus videntur ſolæ membranæ, quibus hinc inde tegitur folium, exiguis interceptis utriculis, unde facilè à lumine pervaduntur, & diaphanæ fiunt. In aliis, ut in *lauro*, hujuſmodi Zona craſſior eſt, & exteriùs oblongis cooperitur utriculis ; interiùs verò ligneæ fiſtulæ, reliquis continuatæ, excurrunt. In *limoniis malis* pariter circumducta linea diaphana eſt, in qua veſiculæ interſeruntur oleo refertæ. In laciniarum apice, in quas folia jam ſolvi vidimus, dum tenella adhuc vegetant, papillæ & utriculi quidam eminent, diverſos continentes ſuccos. Ita in *meſpilorum* folio 110, etiam adulto, ab appendicibus laciniatæ partis *A* aſſurgit quaſi margarita *B*, diaphana, electrum æmulans, ad cujus radicem & inſertionem fibra perpetuò deſinit ; hac laceratâ terebinthina funditur. *Ceraſi* 111 extremos pariter fines excurrit rubicunda Zona *A*, à pediculo aſſurgens ; ab anguloſis itaq; laciniis papilla, ſeu utriculus *C*, eminet, rubicundi pariter coloris, qui glutinoſum evomit ſuccum. In *populo*, & *vite* 112, etiam conſimilia locantur terebinthinæ receptacula. In hac, ab extremo folii apice angularis quaſi ſacculus *A* elongatur, qui, licet continuatâ cuticulâ excitetur, viridi tamen colore non inficitur, ſed à contenta terebinthina, quâ turget, coloratur : Vaſa quoq; & fibras *B* recipit.

Folia, quorum copiâ luxuriâſſe videtur Natura, ſunt præcipuę inſigneſq; partes, quibus arbores & herbę integrantur: Illa enim omnia, quę in trunco, ſeu caule, principe vegetantium parte, colliguntur & quaſi compendio coercentur, ulteriori productione in extremis & junioribus partibus ſoluta, in folia exeruntur, ita ut elongati & laciniati trunci appendices videantur. Nil mirum igitur, ſi coſtulę, fiſtulę ſcilicet ligneę, unâ cum tracheis à tenelli circuli profundo ligneo cylindro deriventur, & ut plurimum in faſciculum recollectę petiolum efforment, & tandem ſolutę reliquum folii compleant. Et quoinam Naturę mos eſt, ut ligneis fiſtulis, truncum & caulem conſtituentibus, aliud receptaculorum genus appendatur, tranſverſales ſcilicet utriculorum ordines; ideo in pediculi diramatione & diviſione erumpentes utriculorum varię ſeries, diverſam foliorum ſpeciem efficiunt. Excoctus in his humor, fortaſſe ex proprię naturę vi & energia, craſſitiem, lentorem, longitudinem, vel brevitatem, & mollitiem, in pendentibus utriculis excitat; unde diverſę inciſurę profundę & minimę ſuccedunt: Argumento ſint arborum ſylveſtrium folia, & præcipuè *mori*; hæc altis inciſuris ſolvuntur, nec multùm latitudinis & extenſionis habent; inſitione autem, dum ulteriori culturâ urbanus efficitur caudex, ampliora redduntur folia, & minimis crenis ſolvuntur.

Taliter excitata folia videntur à Natura fabrefacta, ut coctioni alimenti, quę præcipua eſt, inſerviant: Nutritii namq; ſucci portio, quæ radices ſubingreditur, nec in appenſas tranſverſales ſtirias derivatur, poſtremò à ligneis fiſtulis in folia exoneratur; ideo neceſſe eſt, ut in ipſorum quaſi tranſverſalibus utriculis moram trahat, & antiquo ſucco commiſceatur, & fermentetur, juvante non parum externo ambientis aeris calore, ut facilius tranſpiratio inutilium evolet. Hinc Natura copioſas ſui generis glandulas pro ſudore, lentoq; excernendo humore, foliis addidit, ut completa coctione defæcatior in ipſis nutritius reddatur ſuccus. Diu meditatus ſum, cuinam animalium parti analoga ſint folia: Cum enim plantę motu locali careant, muſculis deſtitui fas erat; ventriculo, pancreate, liene, & hepate nequaquam egent, cùm hæc animalium viſcera circa chyli elaborationem perpetuò inſudent, quod, in plantis, terrę & radicum miniſterio expletur. Quare ſatiùs credidi, cutis ſeu corii munia ſubire; hæc in animalibus nervorum, arteriarum, venarum, lymphaticorum fortè, tendinum, & glandularum compage ita excitatur, ut effluens nutritius ſuccus per exiguos meatus novam partium adaptationem & fluorem adipiſcatur, inutilia ſeparentur, & manifeſtis ductibus eliminentur, noviq; fermentativi ſucci ſeparentur; & tandem redux iterum interiora animalis nutriat & vivificet: Quare infectâ cute non parum labis reliquo ſuccedit corpori, ut in cutaneis morbis experimur. His analoga de facili deprehenduntur in foliorum ſtructura, & conſequentibus uſibus. In folia, compendio quodam, ſingula vaſa, tracheę ſcilicet, fiſtulę ligneę, & peculiaria vaſcula deſinunt extremis finibus, nec deſunt ſudoris vaſcula, & tranſpiratus, pili quoq; ſubcreſcunt. Expoſitæ curſim hæ

cogitationes

F. 107.



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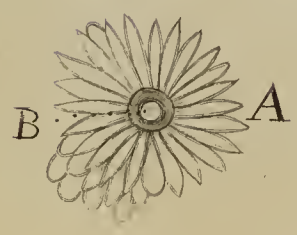
F. 108.



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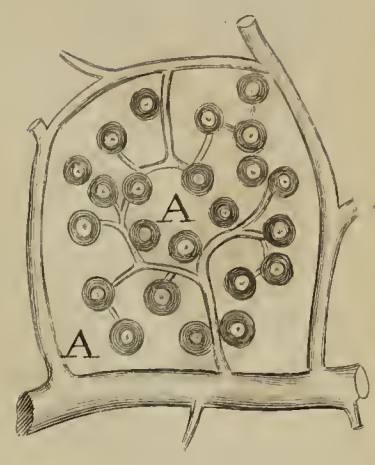

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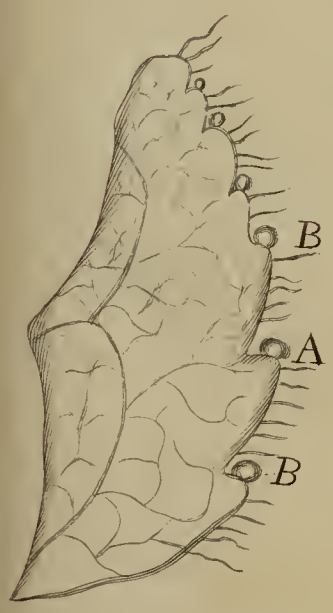

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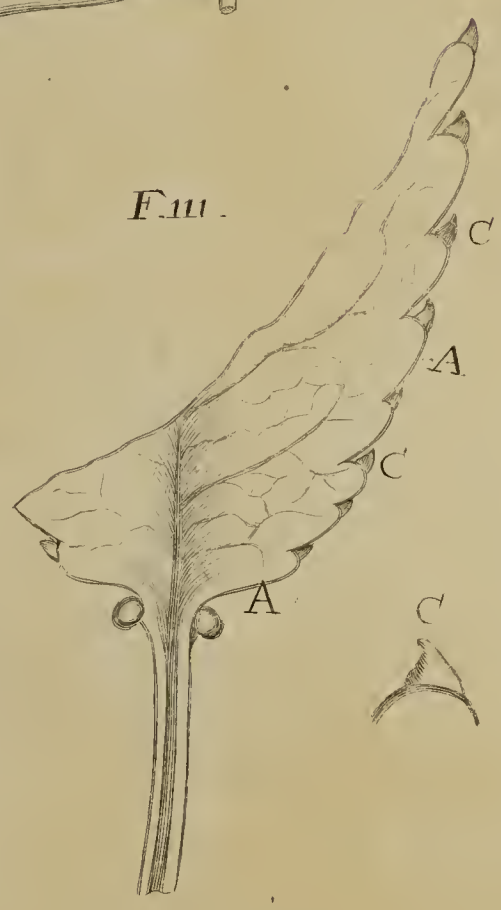

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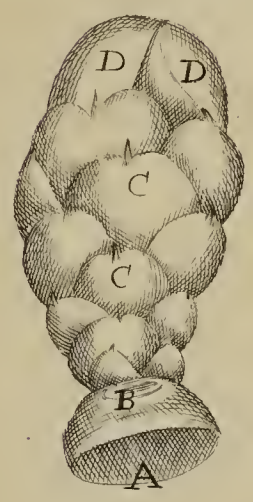

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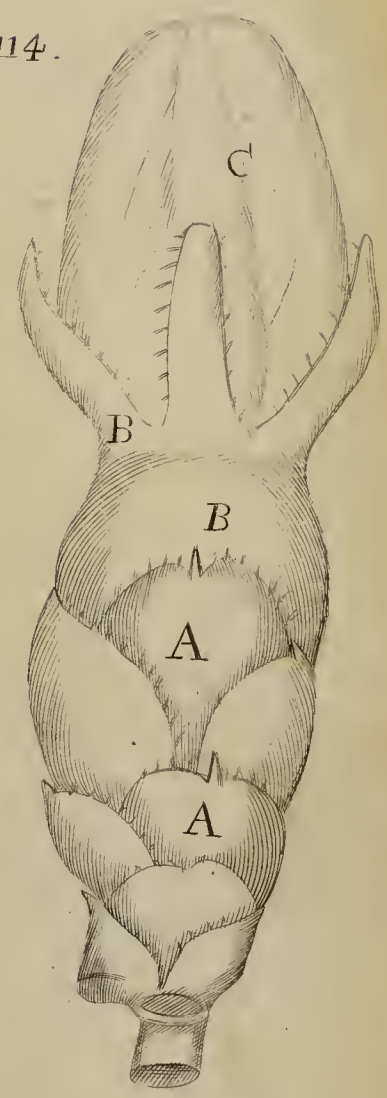
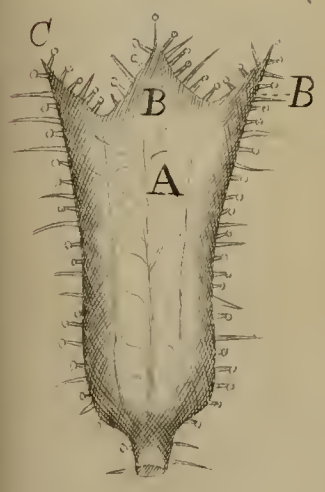
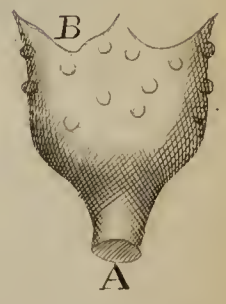


F. 116.



F. 112.

F. 115.



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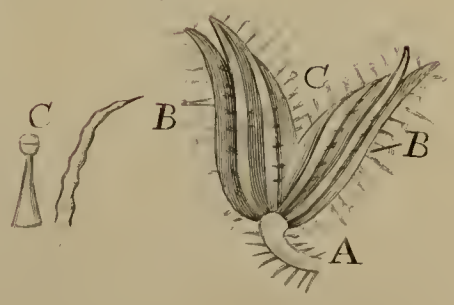
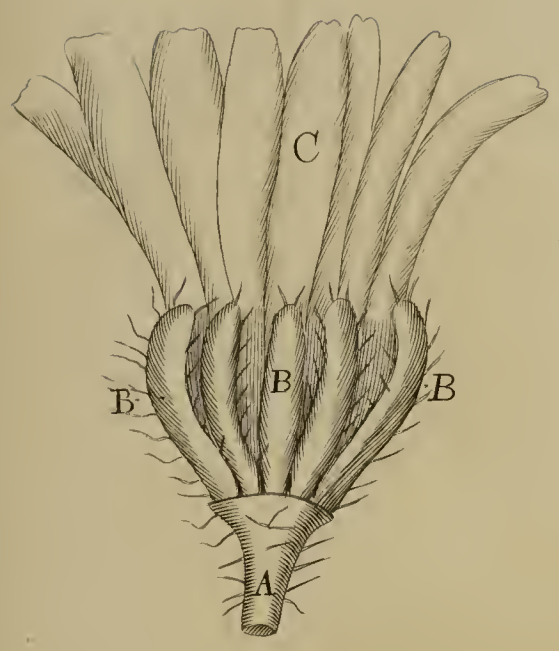


F. 117.

F. 119.



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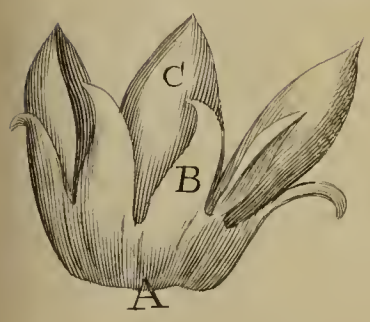
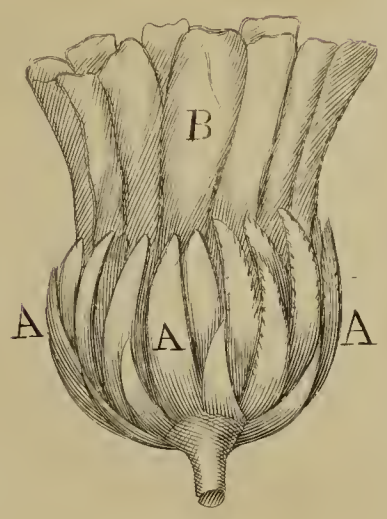
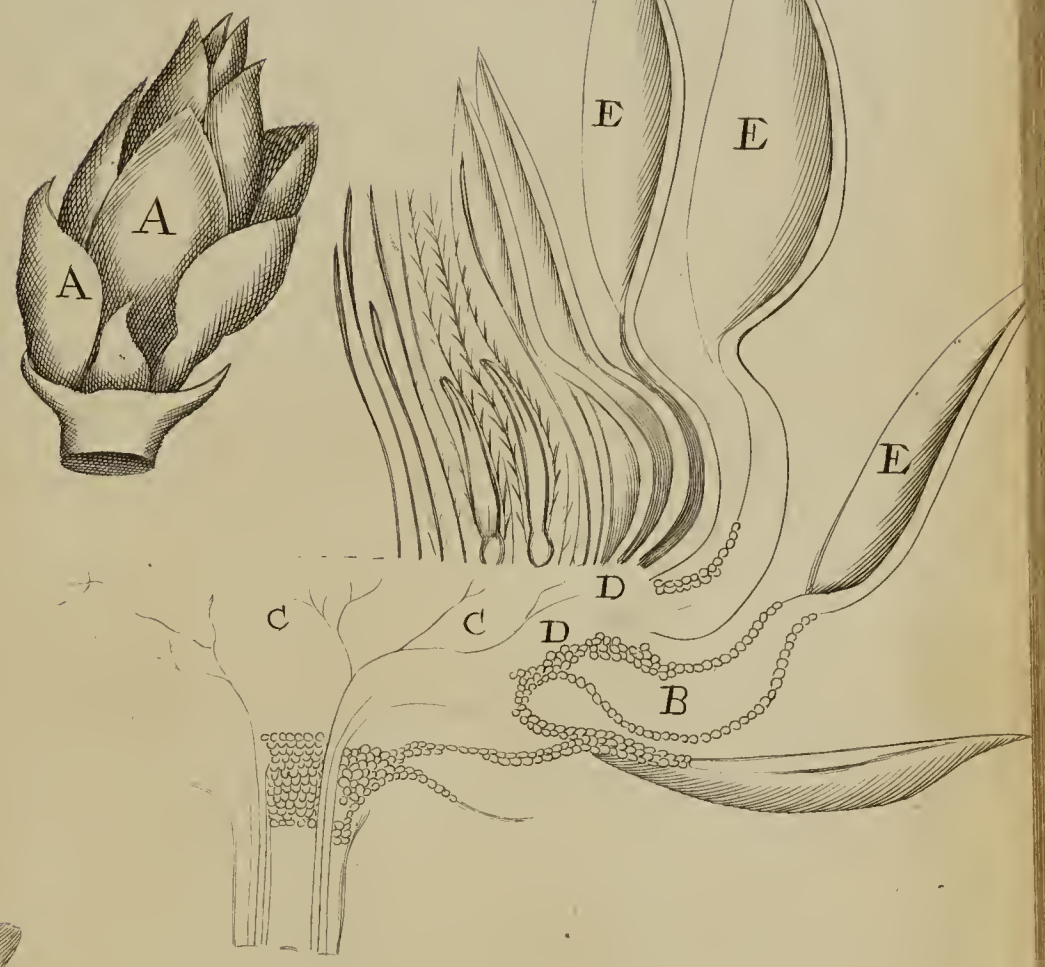


F 121

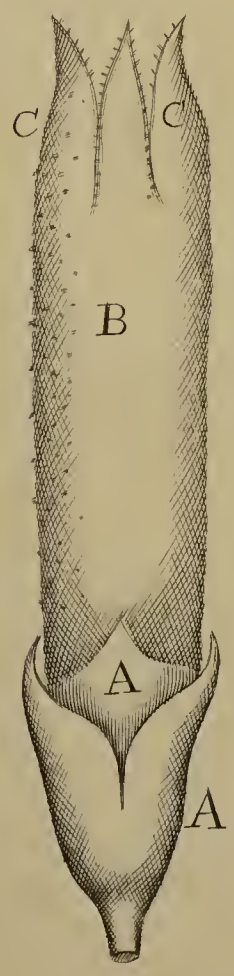
F. 122.



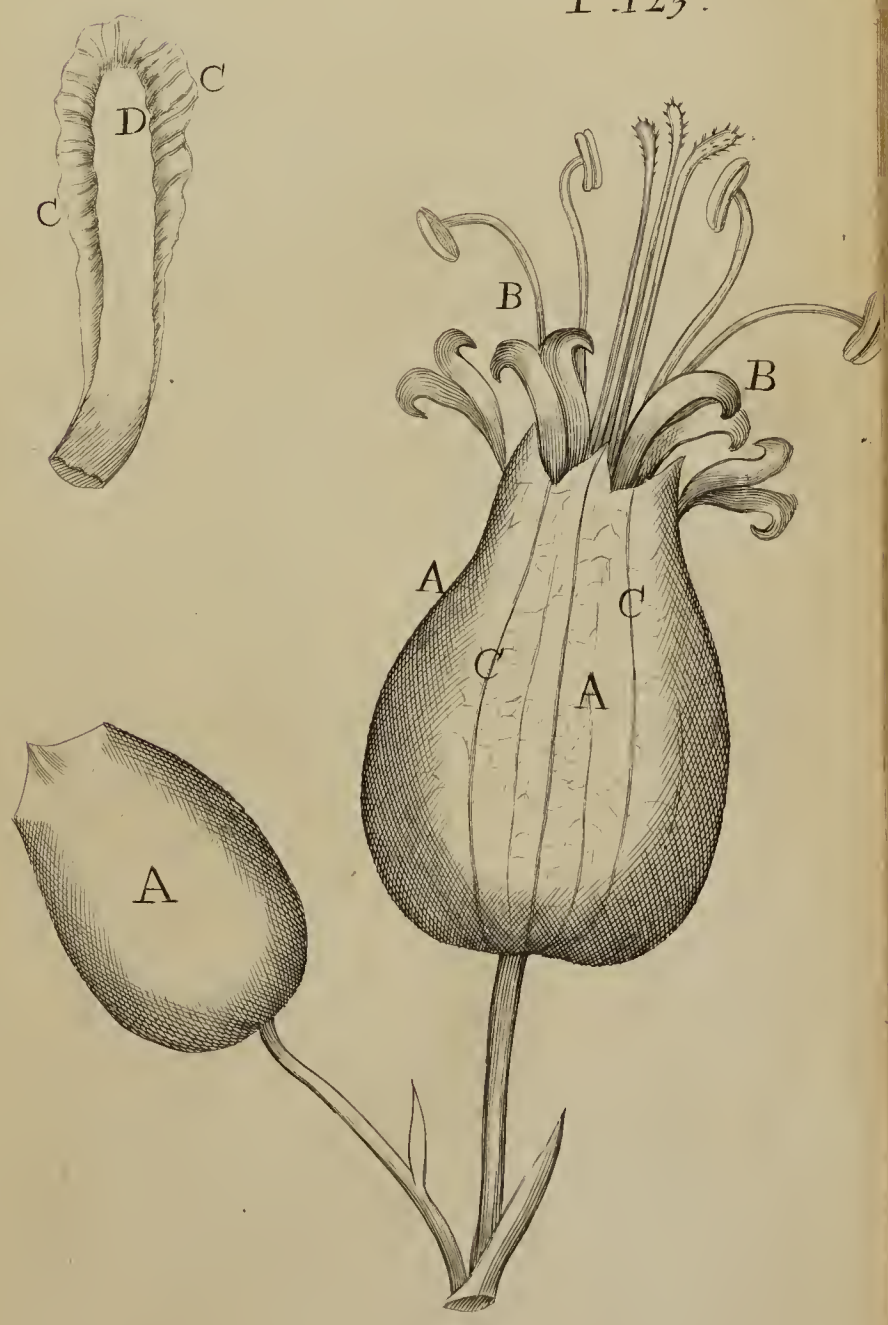
F. 123.



F. 124.



F. 125.



cogitationes firmari poſſunt obſervatione eorum, quę in reliquis imperfectis animalibus contingunt : Proximum namq; *inſectorum* genus tam ingentem circa corium congerit humorem, tamq; repetitis vicibus pellem vel ſaltem cuticulam renovat, rejectis veteribus, ut in continua mutatione verſetur. Quid ſimile in Plantarum *foliis* miramur; ſingulo anno ut plurimùm, corruptis minimis meatulis exhauſtoq; antiquo ſucco, cùm ampliùs naturę nequaquam inſerviant, abjiciuntur, novumq; organum excitatur; & quibus in plantis folia adhuc virent, novis tamen æſtate germinantibus gemmis, antiqua, maraſmo confecta, collabuntur. Probabilem nutritii ſucci in foliis coctionem indicare videtur ſeminalis plantulæ ſtructura: Hanc, (ut ſuo loco patebit) conſtare geminis foliis, evidens eſt, quę propriis vaſculis, & utriculis, ſucco turgidis, ditantur, ut mole ſuâ reliquum plantulæ ſuperent: In germinatione verò ſoluti & turgidi hujuſmodi plantulæ humores, advenientem ſuccum fermentant, & augent antiquum, ita ut in ampla folia extendantur, ut patet in *endivia*, *peponibus*, & *cucurbita*, cujus ſeminalia folia in tantam excreſcunt molem, ut vix credibile ſit; &, ablatâ cuticulâ, ſeries pendentium utriculorum tam manifeſtò exhibentur, ut evidenter pateat, folia hujuſmodi conditoria eſſe ſeu penu concreti ſucci. Quoniam tamen ſenſim vegetante radicis trunco, & plantulę germine, contabeſcere incipiunt hujuſmodi folia; hinc conſtat, à foliis in caulem & caudicem regreſſum eſſe concocti ſucci, & quaſi peculiarem circulationem.

Remittunt itaq; *folia* probabiliter concoctum ſuccum, ipſumq; in annotino & novello ſurculo, cui adnaſcuntur, congregant, ut in tenellam gemmam abſumatur: Etenim non longè ab inſertione & folii eruptione gemma poſt aliquot tempus ſuccreſcit, & maturato per longum tempus in ſurculo coercitus humor, advenientis veris ope refermentatus, in delineato gemmæ fœtu abſumitur, & nutritionem inchoat; unde videtur nulla ſubcreſcere ut plurimùm gemma quam non antecedat & ſucceſſivè alat folium.

Idem miniſterium præſtant probabiliter folia *ſeminibus*, cum hac tamen diſtinctione, ut ſingulo anno erumpentia folia tot novellas gemmas axillis foveant & alant: Semen autem ut in perfectioribus animalibus ſtato tempore eſt fœcundum, firmatâ ſcilicet animalis ſtructura, & maturato interno fermento; ita non quilibet ſurculus fructificat ſingulo anno, ſed tertia tantum ſoboles, cùm trium annorum curriculo maturetur & exaltetur ſuccus in antiquiori ſurculo, & ita poſtremò fructificet.

De FLORIBUS.

PLantas ſingulo quoquo anno vegetantes jam contemplati ſumus: Tantus verò partium apparatus ſolius *fœcunditatis* gratiâ comparatus videtur, ut tandem, renovatis ſeminalibus organis, novus progignatur fœtus: Hæc igitur in *Flore* Natura concluſit, qui pleni veris & renaſcentis anni indicium, arborumque gaudium meritò appellatus eſt: Hic idem luxuriantis magnę matris fœcunditati, odorum colorumq; gratias ludentis Veneris aſſociavit. Erumpit ab arboribus quamplurimis *Junii* menſe, eâ ſcil. tempeſtate, quâ gemmę, quę futuro vere aperiri debent, emergunt. Propria foliorum textura, qualis in gemmis obſervatur, debitè cuſtoditur: Ita patet in *ceraſo*, *pyro*, & *lauro*: In aliis autem, & præcipuè in *roſis*, *vite*, & *ſambuco*, à tenello ſurculo, qui mox ineunte vere prorumpit, ſeſe exerit. *Flores* igitur, qui propriâ gemmâ cuſtodiuntur, ſeorſim ab annotino ramo prodeunt; horum gemma in *malo armeniaca* 113 elegans eſt; nam à tenello ſurculo *A*, ſupra delapſi folii cicatricem *B* aſſurgit, foliorum *C* ſquamatim poſitorum compage coagmentata; in aprico laxatur turgentibus floris foliolis *D*, in orbem circumductis. In hac per longum ſectâ, foliorum, quibus gemma excitatur, exortus *E* patent, reliquaq; quibus flos integratur. Idem accidit *prunis*, & *amygdalis* 114, quarum multiplices foliorum ordines *A* contentum diu florem fovent, qui ineunte vere primo pullulat, emergente calyce *B*, & foliis *C*. In *ceraſo* multiplices flores unâ conteguntur gemmâ, cujus foliola reliquorum more ſucceſſivas ſortiuntur mutationes. In herbaceis, ut in *violaria*, flores proprio pediculo ab implantatione cujuſcunque folii erumpunt. In *cæpis* à centro bulbi caulis aſſurgit, cujus apicem flos ornat.

Flores pluribus partibus componuntur, quarum diverſis formis & luxuriantibus coloribus mira ſuccedit varietas; horum tamen exactam & extenſam delineationem Botanicis reliquiſq; hortorum cultoribus peragendam relinquo, mihiq; tantum ſeorſim rimandas ſuſcipio partes, eâ ſcil. methodo, & numero, qui anatomico negotio & meę tenuitati conducit. Inter reliquas partes, quibus *flos* excitatur, primò *calyx* occurrit: Hic itaq; floris baſis eſt, & fulcimentum, ſuâq; corporaturâ foliorum ſtaminumq; exortum fovet; quin & ipſorum progreſſum plerumq; cooperit: Quare multiplici formâ donatur, & magnitudine. Ut autem aliqualis Naturę methodus habeatur, principaliores exarabo formas, recollectas à ſingulis vegetantium ordinibus. Simplicior *calycis* ſpecies occurrit in *olea*, *citro*, *malo limonia*, & *aurantia* 115, reliquiſq; oleoſis: Ab elongato *limonii* ſurculo *A*, fit quaſi radioſa corona *B*, floris exortum ambiens, fibris & utriculis conſtans, quę, delapſo etiam flore, fructui hærens perdurat. In *hyoſcyamo* 116, calyx tubuloſus *A* craſsâ conſtat ſubſtantiâ, & in ſummitate levibus inciſuris in quinq; ſolvitur foliola *B*, quę copioſis pilis & fungis *C* teguntur.

guntur. Idem calyx magis ſerratus occurrit in habentibus ſiliquam, ut patet in *collutea*, & *piſis* 117, quorum calyx *A*, licet exiguus, in foliola tamen *B* ſolvitur, quę; evaneſcente flore, criſpa reddúntur, & ſuperſunt. Eadem calycis natura, quaſi geminis contexta foliolis, obſervatur in *ſclarea* & *horminio* 118; hujus calyx à petiolo *A* aſſurgens in gemina ſolvitur folia *B*, quæ & ipſa parum dentata fiunt, & copioſis pilis & fungis *C* ornantur. In pleriſq; altiùs laciniatur calyx, unde multiplicia diſtinguuntur foliola; ita in *burſa paſtoris* quatuor excitantur: Frequentiùs tamen quinq; numerantur, ut videmus in *bugloſſo*, *primula veris*, *gerano*, *helleboro nigro*, *cannabe*, *lino*, *oxiacantha*, & *roſis*, quarum floribus nondum hiantibus, calycis foliola exteriùs obducta cuſtodiæ vices gerunt. Plura pariter & copioſiora occurrunt foliola in calyce *fragariæ* & ſimilium; inæqualis tamen magnitudinis, ita ut minora intermedient ampliora. In *belli*, 119, TAB. 22. calyx *A* in ſexdecim ſolvitur foliola *B* viridia, quibus reliquum *C* munitur.

In exaratis hucuſq; floribus, calyx vel exiguis dentibus vel elongatis productionibus ſub eodem plano & circulo ut plurimùm excitatur. Conſuevit tamen Natura in quibuſdam multiplicare foliorum ordines, ita ut à gemino circulo emergant folia; ut in *malva* præcipuè *arboreſcente* 120 apparet, cujus inferior ordo *A* minora foliola *B* promit; ſubſequens verò ordo grandioribus *C* excitatur foliolis. In floribus, qui exiguis minimiſq; floſculis conglomerantur, calyx multiplici foliorum ordine componitur, ut patet in *taraſco*, *belli*, & *cyano odoroſo* 121, in quo folia *A* copioſis ordinibus digeſta, ſquamarum inſtar ſeſe cooperientia, elegantem efficiunt calycem; ſinguli folii ſpecies eſt *B*. Idem obſervatur in *chamæmelo*, & in *buphthalmo* 122, cujus calyx quatuor foliorum *A* ordinibus componitur, quibus floſculis & foliis *B* concha paratur: Singulum calycis folium in exteriori ungue *C* diaphanum eſt, ſpecularis inſtar lapidis. Non longè ab ambiente ungue fuſca quædam extenditur tinctura *D*, quæ gratum offert ſpectaculum. Ex horum indagine fas eſt aſſerere, folia, quibus exteriùs *cinaræ* 123 flos cuſtoditur, veras calycis ſubire vices. Sunt autem folia *A*, copioſiſſimè ſeſe invicem continentia, ita ut in nondum hiante flore quaſi piniforme corpus appareat: Patent autem diverſa plana, & foliorum exortus, ſi per tranſverſum ſecta *cinara* obſervetur. A petiolo *A* ſenſim erumpunt craſſa folia *B*, & ubi laxatur quaſi in rotundum pericarpium *C*, ſub diverſis ſegmentis & planis *D* oriuntur carinata folia *E*, in quę exaratum pericarpium laciniari videtur: Subſequuntur alia calycis foliola ſemper minora, quæ tandem floſculorum congeriem cooperiunt. In *caryophillo*, & *oculo Chriſti* 124, calyx gemino foliorum ordine *A* excitatur, à cujus umbilico novus tubuloſus calyx *B* aſſurgit in apice *C* dentatus. Parum abſimilem ſtructuram miramur in *Been albo* 125, cujus calyx *A* concavus & piriformis tenellum florem *B* fovet, & tutatur; per longum excurrunt vaſa *C*, foliorum inſtar reticulariter implicita. In *amygdalis*, *ceraſis*, *maliſq; Armeniacis*, & *Perſicis* 126, calyx *A* concavus & vacuus turget, & in ſummitate in quinque acuminata foliola TAB. 23. *B*. ſolvitur. Gracilis eſt ipſius ſubſtantia, fibris & utriculis eleganter

contexta; nam exterior corticis portio *C* eadem eſt cum folii *D* laciniata ſubſtantia; ſubſequens verò & media portio calycis ligneis fibris *E* irrigatur, pendentibus de more utriculis; & ab hac, ſtaminum pedioli *F* emergunt: Interior tandem portio lutea eſt & globoſa, & quaſi erumpens moſcus; ab hac candidi pili *G* enaſcuntur. In *meſpilis*, *oxiacantha*, & *malis* 127, ultra laciniata folia *A*, quæ â ſummitate calycis *B* exoriuntur, ſuccedit globoſum & rotundum corpus *C*, quod, quaſi elongatus calyx, in pomi pericarpium faceſcit.

Singulis igitur vegetantium floribus, præter *caltham paluſtrem*, *vitalbam flore cæruleo*, & ſim. ineſt calyx: In pluribus autem bulboſis, ut in *hiacyntho*, *narciſſo*, *lilio Perſico*, *tulipa*, *lilio convallio*, *gladiolo*, & *melilotto*, perianthium, concavum ſcil. quoddam viride folium, ſubrogatur, quo tenellus flos ambitur & munitur; unde citò exſiccatur.

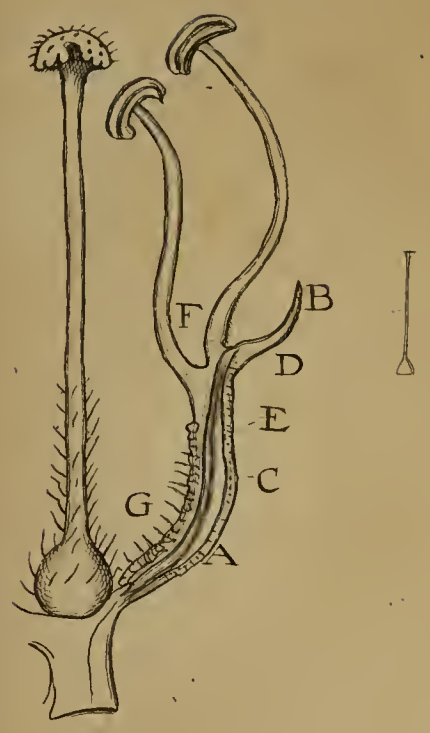
In plantis ſpicas ferentibus, quarum productionem præcedunt flores, probabile eſt, ſuos quoq; adeſſe calyces, cùm tenellum incluſum florem cuſtodiant. In *tritico*, & *avenaceis*, cùm plures germinent flores, copioſa pariter occurrunt folia, quibus calycis munus expletur. In *avena* namq; 128, à calamo *A* geminum folium *B*, *C*, concavum eminet, quod excurrentibus per longum fibris & interpoſitis utriculis excitatur: Succedit ſuperiùs tertium folium *D*, quod gluma dicitur, concavum, oblongam haſtulam *E* promens, & pilos *F*; huic gracile opponitur folium *G*, quo, veluti portâ, concavitas florem *H* continens occluditur.

Licet igitur ex horum indagine ſuſpicari, flores calyce donari, ut ipſorum adhuc tenella ſtructura cuſtodiatur. Elongatur autem ab attenuata corticis & ligni ſubſtantia, ut patet in *meſpilis*, *pomis*, & *malo Punica* 129; in qua à craſſo cortice *A*, concluſa ſemina ambiente, angularia eminent folia *B*, à quorum interiori portione *C* floris partes erumpunt: Evidentius in *cinara*, (cujus calycis folia craſſiora & ampliora ſunt) componentes partes emergunt.

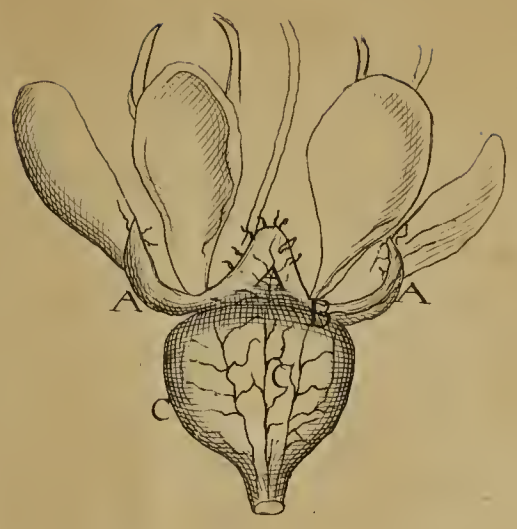
Variè configurantur calycis folia, ut plurimùm tamen angularia ſunt, & dentata. In *Maracot Indorum* 130, quinq; ſunt folia *A* concava, quæ unita tenellum fovent florem; in apice, ſtyliformi appendice *B* donantur. In *rubo canino*, & *roſis* 131, quædam calycis interjecta folia elegantibus ditantur appendicibus; angulare namq; folium *A* elongatur, quod à lateribus appendices *B* profert, quarum extremas acuminatas lacinias rubicundi fungi *C*, terebinthinam fundentes, terminant. His & ſimilibus circumſcripta terminis calycis foliola ſuis interdum armantur ſpinis, ut in *papavere* patet 132, cujus gemina calycis folia *A* recurvis ſpinis *B* exteriùs cooperiuntur, in quarum exortu monticulus *C* utriculis conſtans eminet: Singula hæc folia extremo ungue terminantur, qui ex uno latere *D* adeò gracileſcit, ut facilè oppoſiti folii *E* craſſiorem ſubintret limbum, & ita nulla ſuccedat rimula. In *cinara* & *carduo ſylveſtri*, foliorum apex ſpinâ armatur; in roſis verò fungi & pili abundant.

Supra calycem à dilatato caule vel petiolo erumpunt floris præcipuè ornamenta, *folia* ſcil. Tam variè hæc configurantur, & colorantur, ut impoſſibile

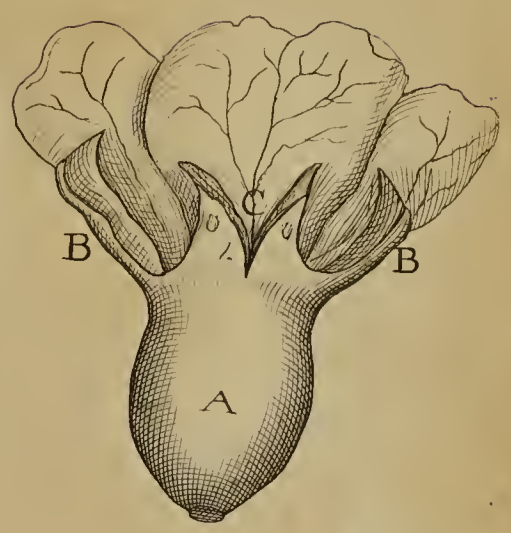
F.126.



F.127.

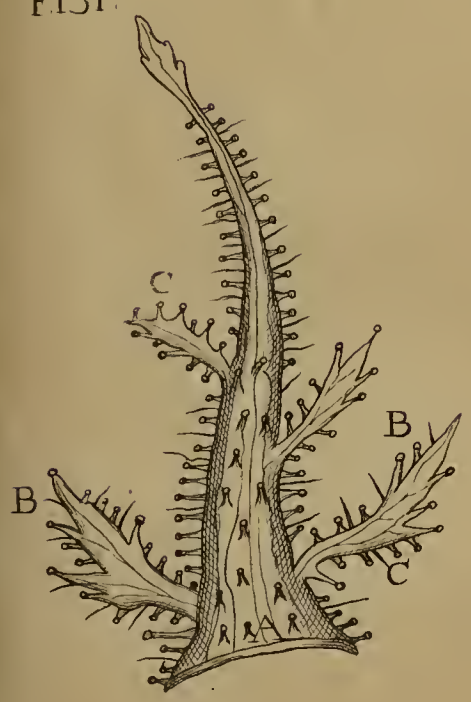


F.129.



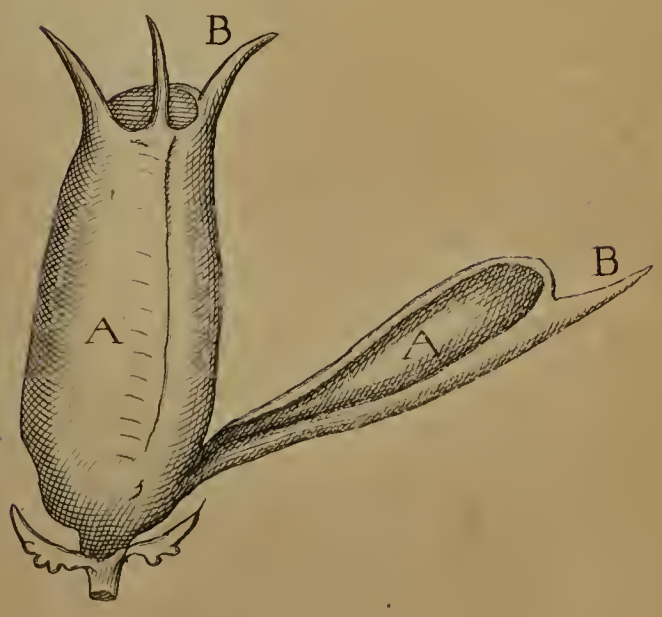
F.128.

F.131.

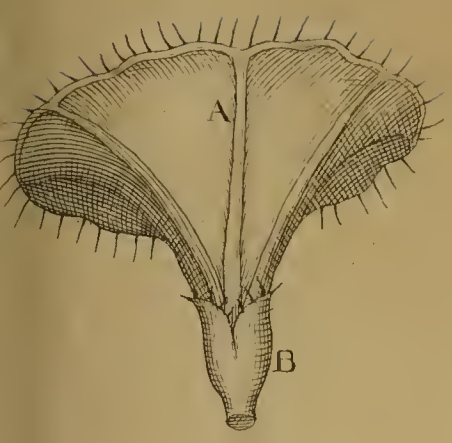


F.132.

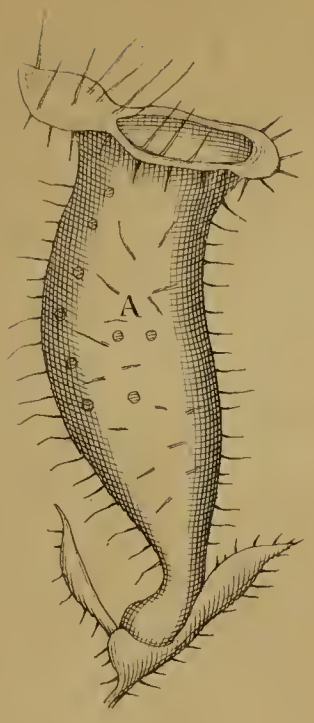
F.130

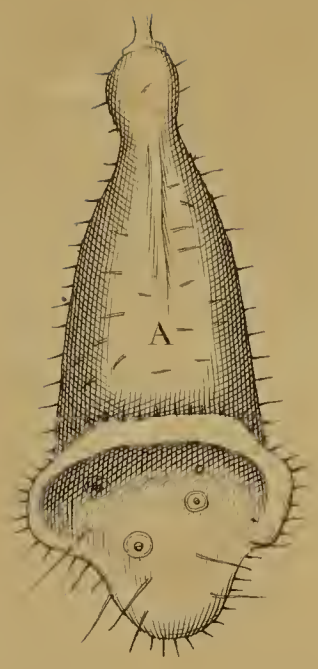


F. 133.



F. 134.





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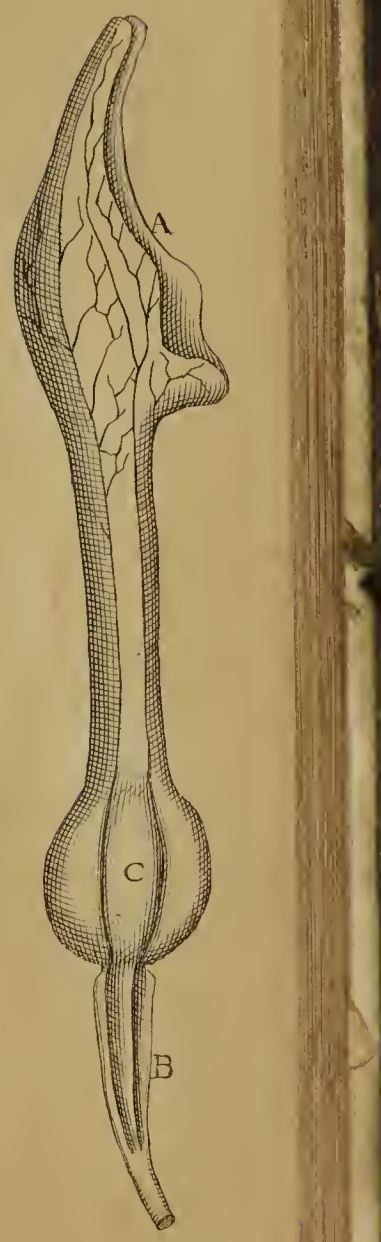
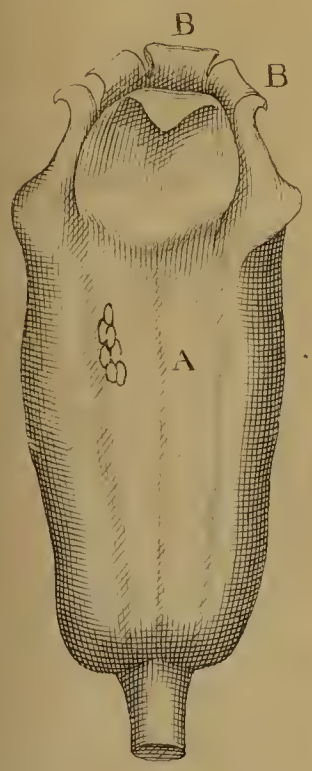
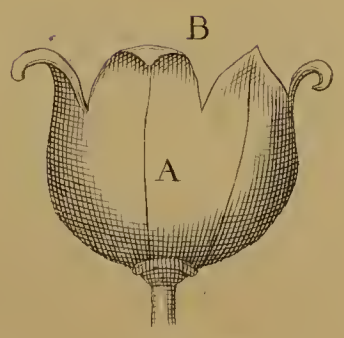
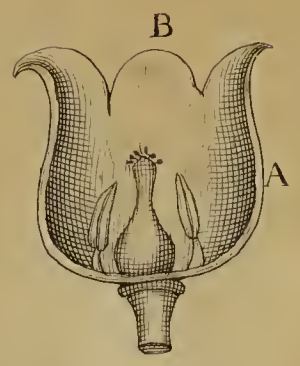


F. 136.



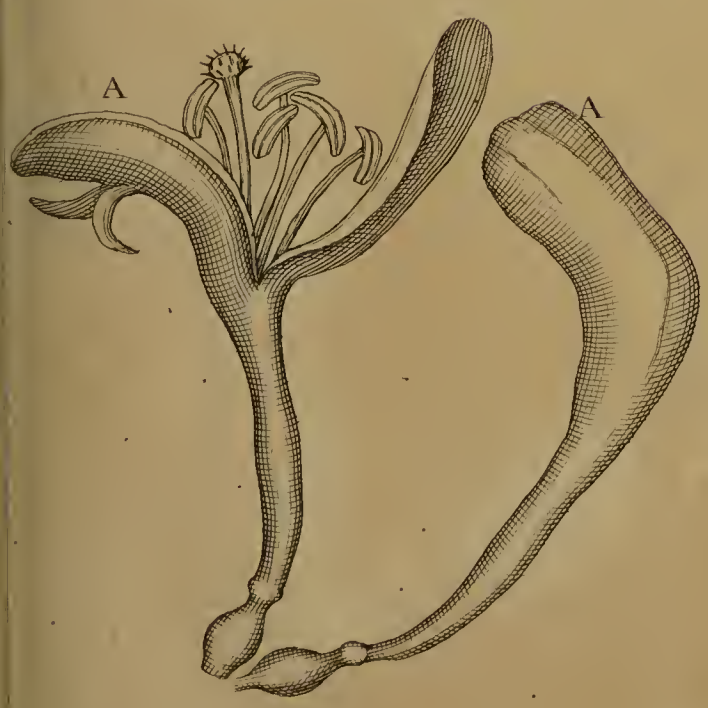
F. 137.



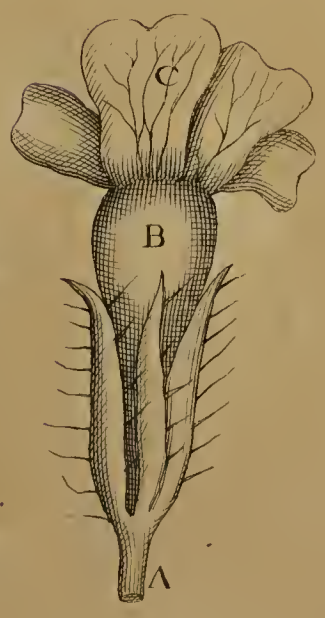


F. 140.

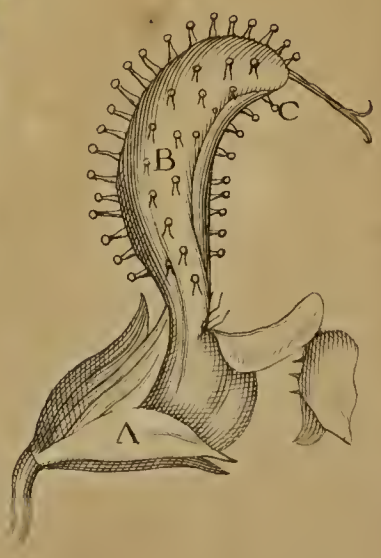
F. 138.



F. 139.



F. 141.



possibile sit singula percurrere; summas tamen exarabo formas, à simplicioribus exordio sumpto. Foliorum itaq; purior conformatio sese offert in *convolvulo* 133, cujus folium *A*, campanæ instar, tubulosum, à calyce *B* usque ad extremum unguem continuum hiat. Idem in *digitali* 134 molitur Natura; tubæ etenim instar *A* sensim dilatatur, & unitate gaudens nullas patitur incisuras. Parum absimili specie conformatum intuemur *aristolochiæ longæ* 135 florem, qui tubulosus & ipse extremum unguem *A* eminentiis inæqualem habet; crasso constat corpore, fibrosis costulis irrigato; à seminum loculis *B* assurgit, & rotundâ excitatâ concameratione *C* stylum custodit. In *Hiacyntho Matthioli* 136, multiplices flosculi ab oblongo pendent cauliculo, & concavâ tubulosáq; constant formâ *A*, crassâ excitatâ substantiâ purpurei coloris, parùm viresc entis; hujusmodi in extremo ungue in sex lacinias *B*, veluti exigua folia, solvuntur. Intus stamina & stylus conduntur. Idem contingit in *lilio convallio*, 137; licèt enim unicum emineat folium *A*, extremo tamen ungue solutum sex quasi foliola *B* promit. *Violarum* pariter, & *caprifolii* 138 unicum extat folium, quod hiatu in quinq; aperitur foliola *A*, quæ subalba sunt, leviq; suffusa rubore. In *jasmino albo*, *narcisso*, *bugloss o*, & *primula veris* 139, à pediculo *A* supra calycem evehitur floris folium *B*, quod tubulosum in quinq; laciniatur folia *C*. Elegantiori conformatione procedit Natura in *papilionaceis* floribus; in *faba* namq; & *pisis* 140, multiplices erumpunt flosculi: Intra calycem *A*, folia *B* nondum hiantia reliquum floris cooperiunt: Aperto autem flore, folium *C* reflectitur, & erigitur veluti papilionum al ę; reliqua verò folia *D* eminent. In *Galeatis* pariter ludit Natura; in *horminio* namq; 141, à calyce *A* emergens folium *B*, concavitate reliquas folii partes *C* fovens, mirabile sui exhibet spectaculum. Quid simile occurrit in flosculis *palmæ Christi* 142, cujus uterus striatus *A* attenuatur in floris folia, & primò horizontale extendit folium *B*, quod tubulosum *C* corpus deorsum promit, superiora autem versùs foliola *D* attollit, in quorum medio, galeæ instar, eminet E, à quo stamina erumpunt. *Buccini* 143 flos recurvo pendet petiolo *A*, à quo producuntur folia *B*; ab eodem emergit, cornu instar, folium *C*, quod superius hians horizontalem appendicem *D* promit. In exarato folio *C* conditur alterum tubulosum folium, cujus superior pars, galeæ instar *E*, eminet, & ab hujus hiatu stamina *F* emergunt. Elegans pariter est *polygalæ* 144 structura, supra cujus calycem *A*, gemina extenduntur rosea folia *B*; ab horum medio floralis assurgit tuba *C*, quæ in apice in bina solvitur folia *D*; à tubæ hiatu corpus exit, in filamenta *E* solutum. Profundioribus excitatis divisionibus interdum folia multiplicat Natura, quæ unico exorta à calyce eundem sortiuntur exortum: Hoc patet in *lauro*, & *gladiolo* 145, cujus flos tubulosus *A* in quinq; inæqualis magnitudinis folia *B* solvitur, quorum ope assurgens stylus *C* custoditur. Quid simile in *arborescente malva* observatur.

TAB. 24.

TAB. 25.

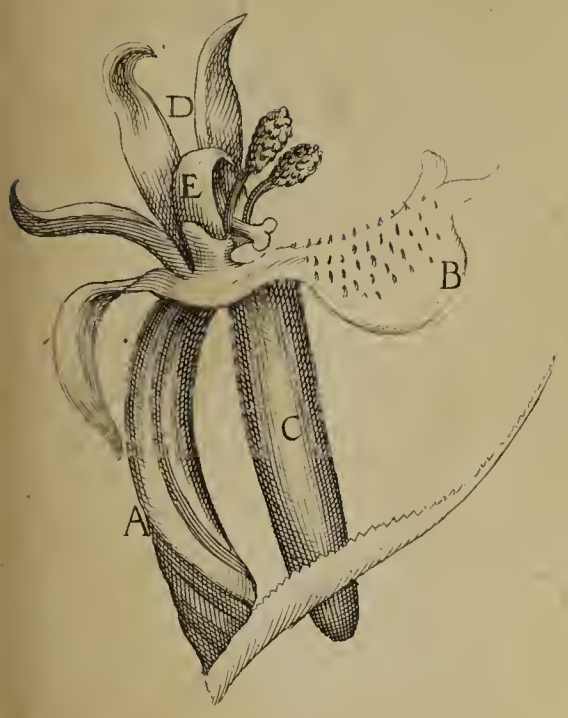
Frequentiùs multiplicata folia undequaq; libera singulari implantatione erumpunt; hoc mirari licet in *uva*, *piro*, *tritico*, *cerasis*, *prunis*, *oxiacantha*,

cantha, & *rubo canino* 146, cujus folia *A*, ſupra calycem *B*, à ſeminis capſula, ſub uno circulo *C* emergunt.

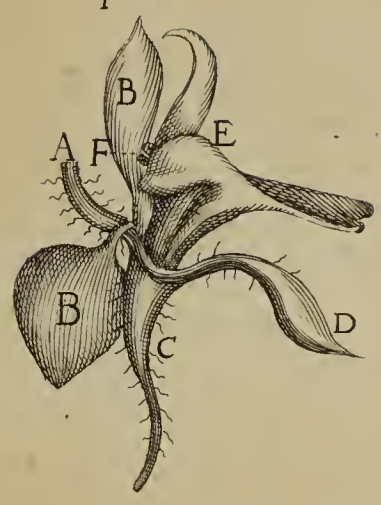
Solet natura interdum multiplicatis foliorum ordinibus ditiores reddere flores; ita in *primula veris* flos ſimplex tubuloſo, hocq; unico, conſtat folio, quod in apice altè laciniatur; in flore verò duplici 147, alterum additur folium, quod exteriùs criſpis coſtulis *A* munitur, & laciniatur in *B*; à baſi verò *C* unà cum grandiori folio *D* exoritur, & ſtylum *E* pariter tutatur. In *Anglica* autem *primula veris* 148, flore pleno, cauliculi extremitas latior reddita, primò calycis folium *A* promit; ſenſim in criſpa folia *B* extenditur, quæ à ligneo cylindro fibras *C* recipiunt, & tandem quaſi in gemmam *D* deſinit. Folia *E*, quæ ſupra calycem emergunt proceriora, in apice inciſuris ſoluta, plura edunt foliola *F*; inferiùs in alia gemina *G* dividuntur; ſtylus ex toto deficit, & in foliis *F*, ubi ſtamina erumpere ſolent in ſimplicioribus, macula quædam lutea *H* interiorem folii ſubſtantiam tenet. In *arboreſcente malva* 149, ſupra calycem, hîc laceratum *A*, attollitur tubuloſum corpus *B*; quod in ſimplicibus ſtamina tantùm promit: Ab hoc emergunt quam plurimi ſtaminum petioli *C*, inter quos locantur rami ſeu floſculi *D*, varia floris folia edentes, quæ hîc detruncata indicantur. Superior verò portio, ſtaminum *petiolis* in faſciculos recollectis *E*, abſumitur. Interiùs, loco ſtyli ſæpe Natura vel Caſus ludit: Nam aliqui ſtyli, ſeu uteri cum tubis, graciles tamen, conduntur; reliqua ſunt folia quaſi molæ; in ſummitate enim tubam uteTAB. 26. rinam *F* 149 promunt, reliquo verò corpore *G*, parum concavo, folii tamen naturam ſervante, unum vel alterum ſemen vel veſiculam *H* fulciunt: Quandoq; geminæ tubæ *F* à concavo folio attolluntur, & intus ſeminum inchoamenta *I* cuſtodiuntur. Quandoq; materia plurium uterorum indiſtincta conglobatur in unicam molam, & frequenter, ſeminis loco, ſola ſuccedit veſicula, unde mirabilis eſt floris hujus indago. In *hyacintho maximo flore pleno* 150, multiplicia ſunt plana, à quibus varii foliorum ordines exoriuntur. Primò namque cauliculus *A*, ſenſim dilatatus, craſſum cæruleumque promit folium *B*, quod ſuperiùs in diverſa dividitur foliola *C* & *D*. Idem cauliculus, ſurſum productus, hinc inde in varios foliorum exortus *E* abſumitur, & apex *F*, quaſi gemma, pluribus ſeſe invicem ambientibus foliolis conglobatur; in hoc, nec ſtamina nec ſtylus apparent. In *hyacinthis*, quorum flores exiguis foliis componuntur, ipſorumque cauliculi apex in folia non abſumitur, ſtylus cum ſeminibus luxuriat. In *ranunculo duplici* 151, coloris lutei, extremus ſurculus in pineale craſſeſcit corpus *A*, quod ſub variis planis horizontalibus foliorum ordines *B* promit, & in ſummitate abſumitur in foliola *C*. Sectum hujuſmodi corpus *A* exhibet fiſtularum progreſſum *D* in ſingula foliola & utriculorum *E* congeriem, quibus veluti pericarpium excitatur. In hoc & ſimilibus nullum ſtaminum ſtylique veſtigium extat. In *violis flore pleno* 152, ſurculi ſubſtantia *A*, ſicut in reliquis in ſiliquam abſumitur, ita in his ulteriùs producta cauliculum efformat, qui in diverſis planis, quaſi tot nodis, lutea floris folia *B* promit, proprio firmata petiolo *C*, cujus exor-

tui

F.142.



F.143.



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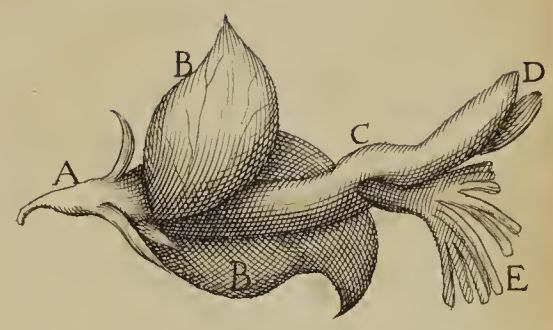

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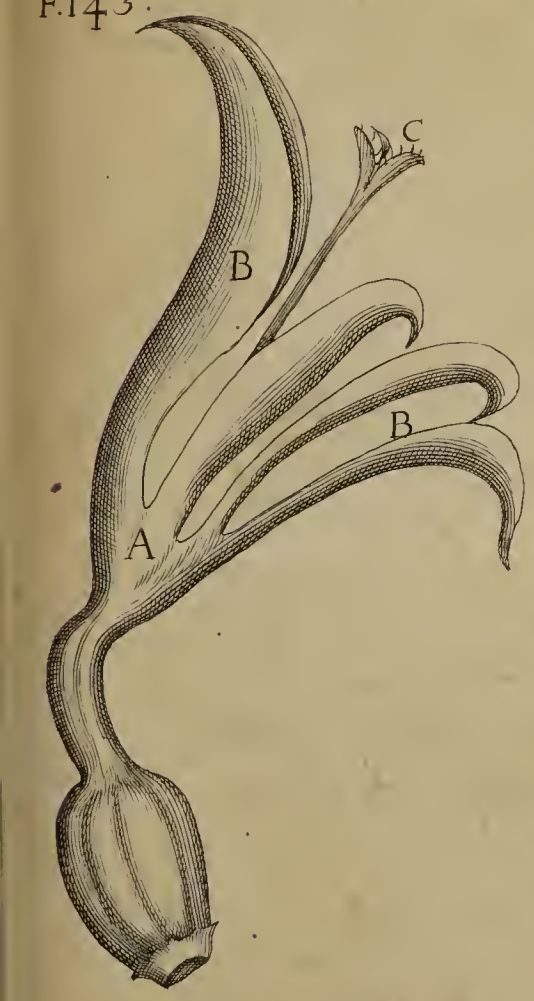

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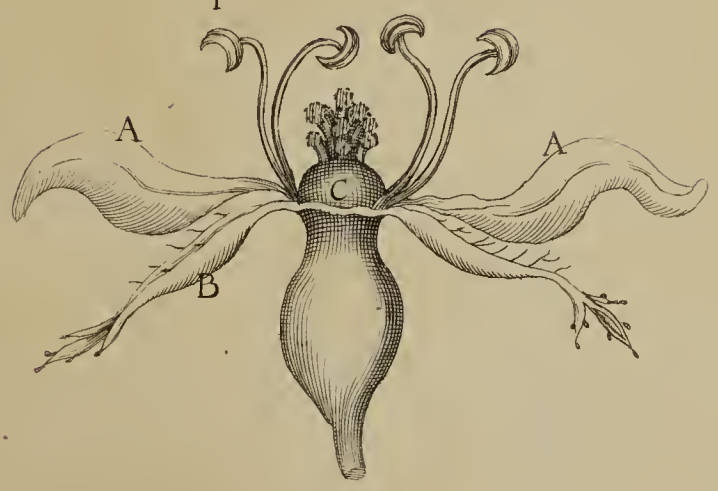

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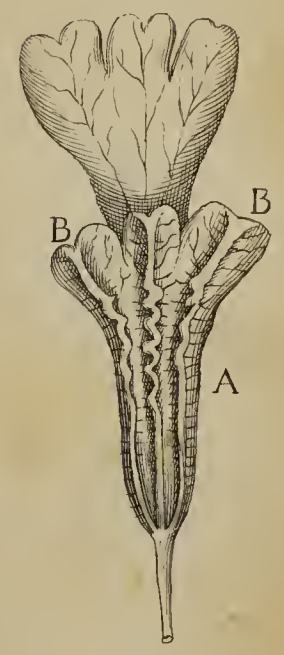

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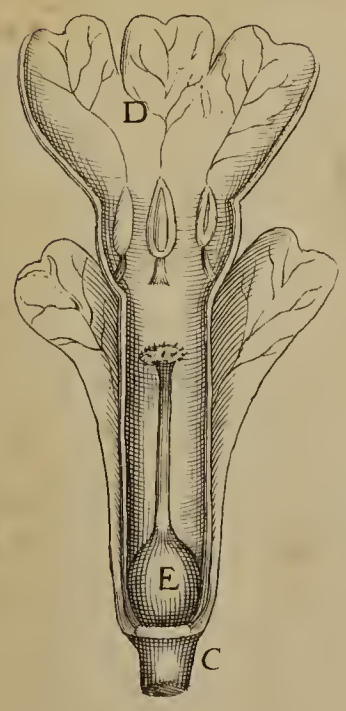

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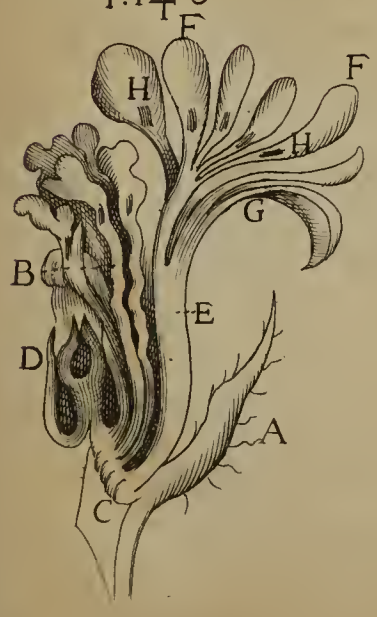

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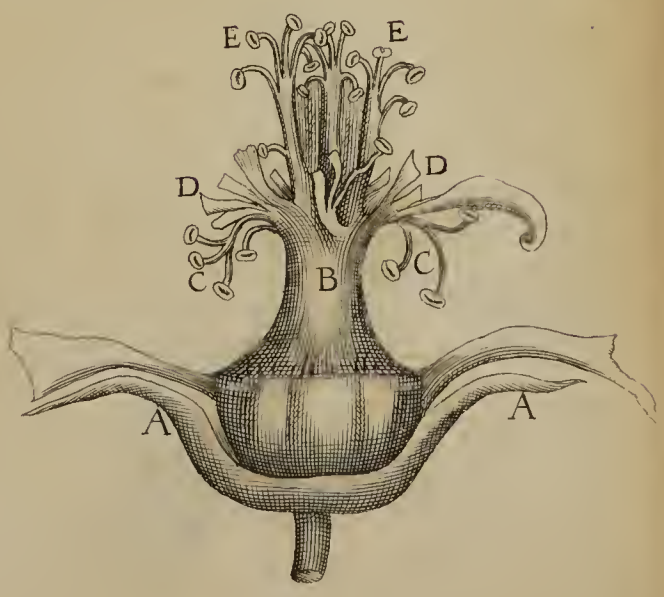

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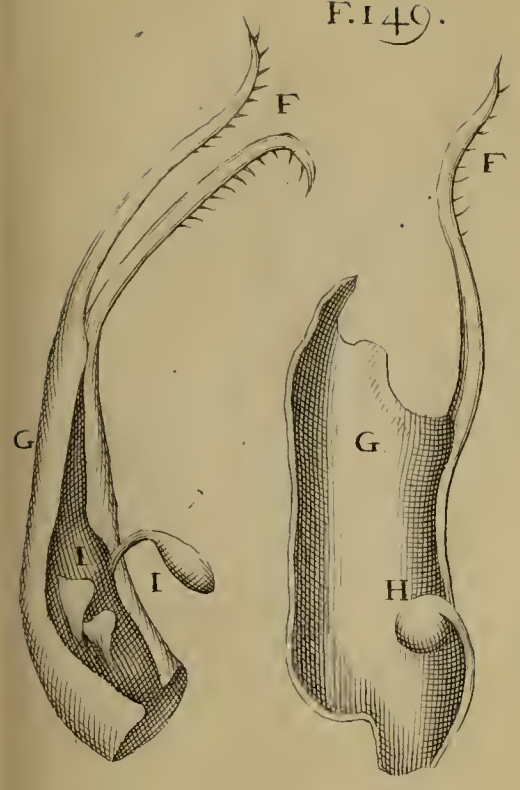

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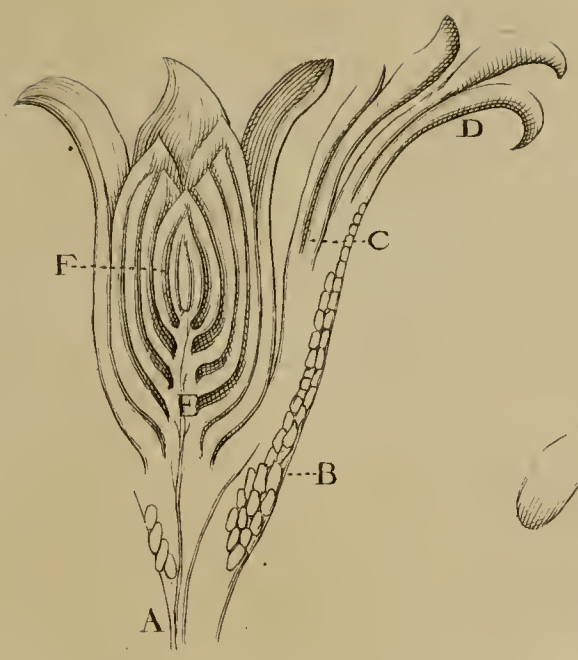

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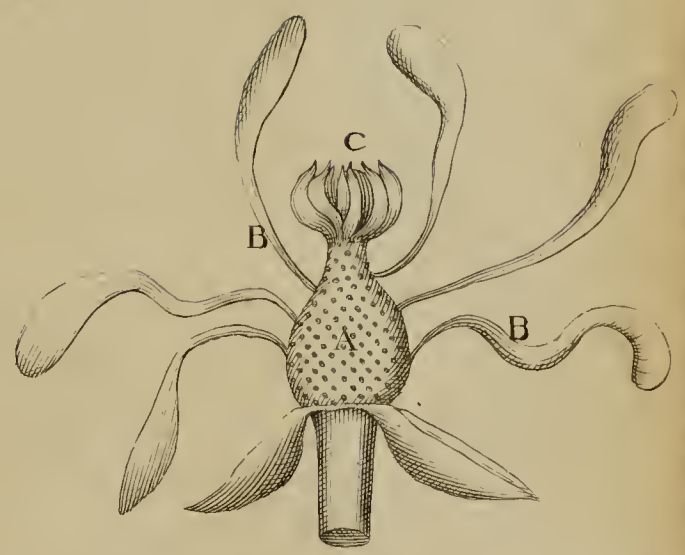

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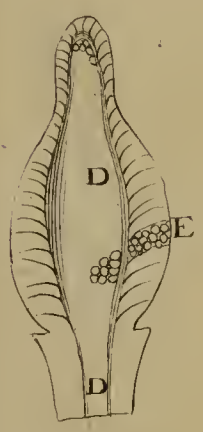

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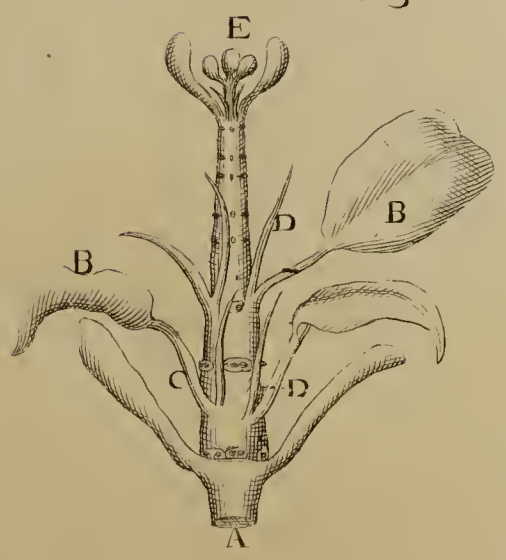

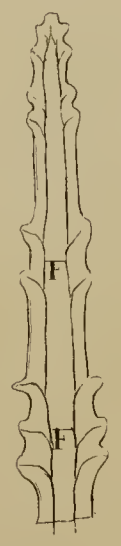

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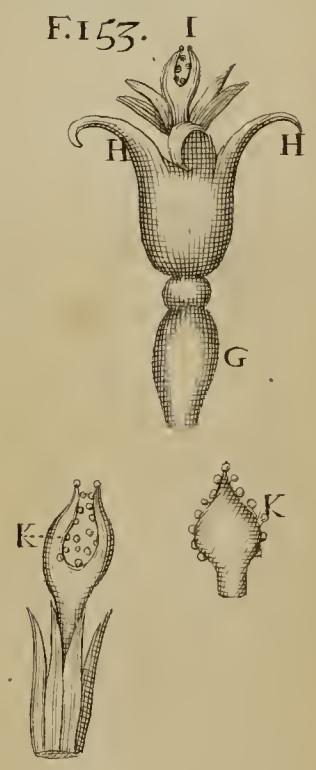

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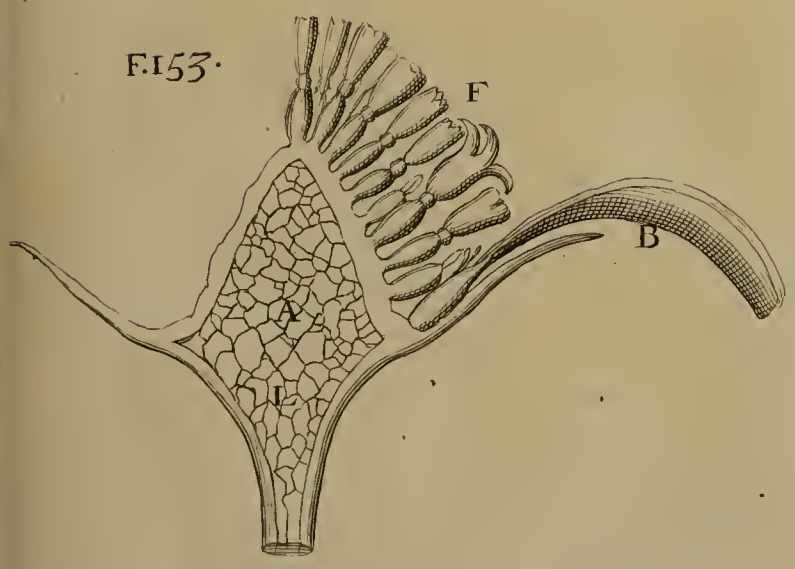

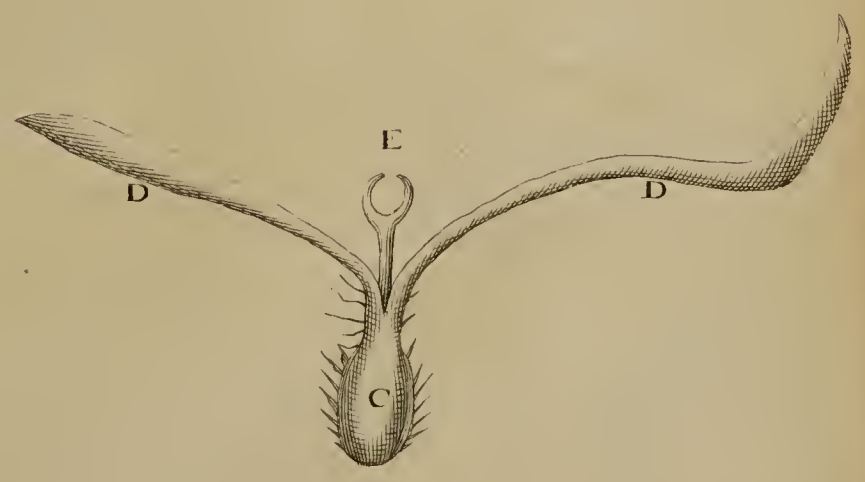

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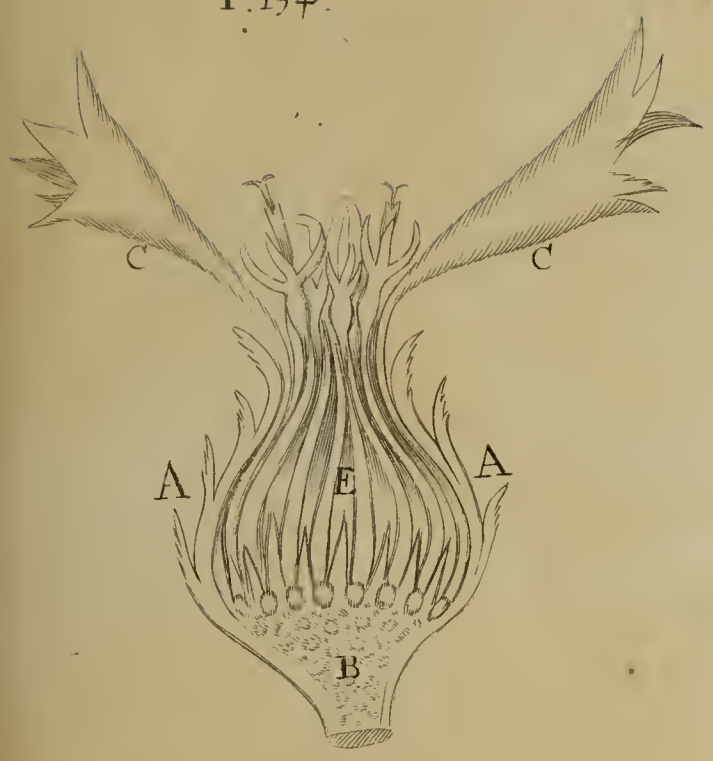

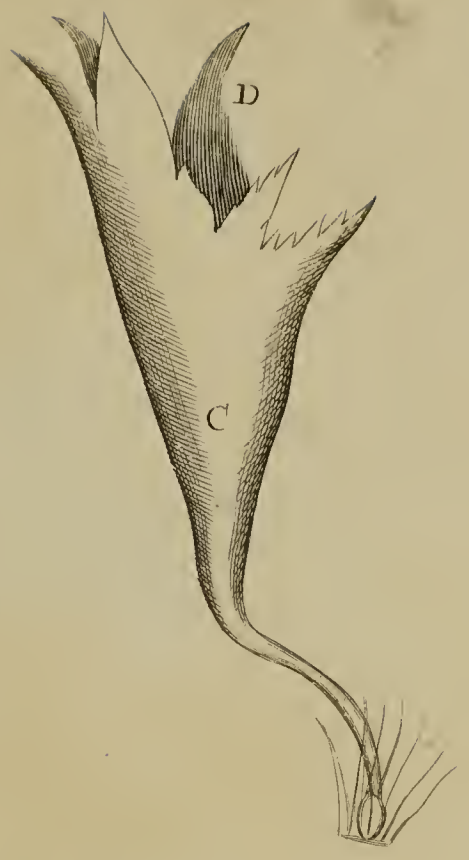

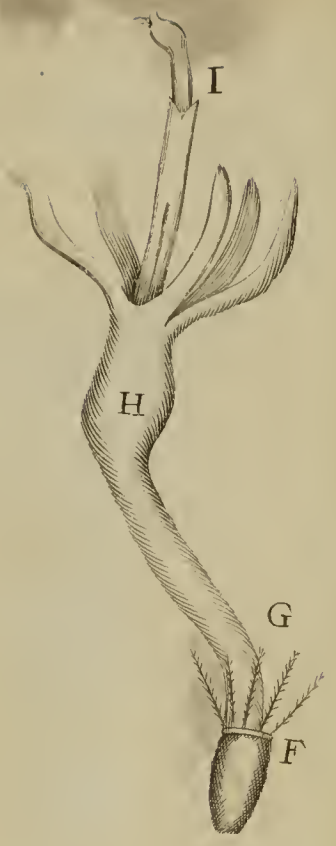

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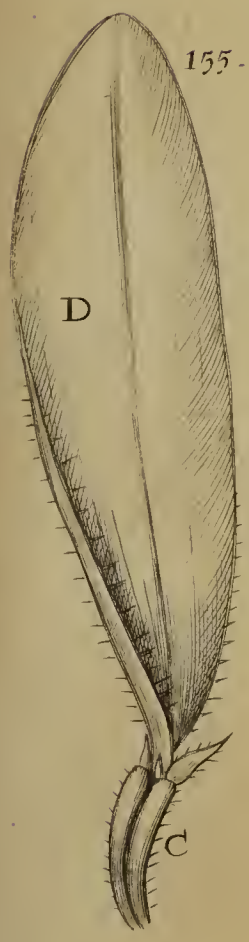

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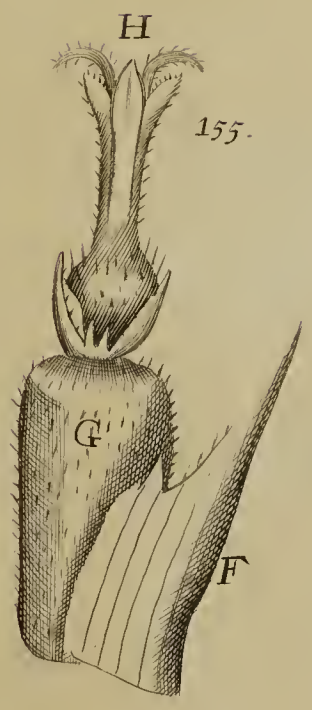

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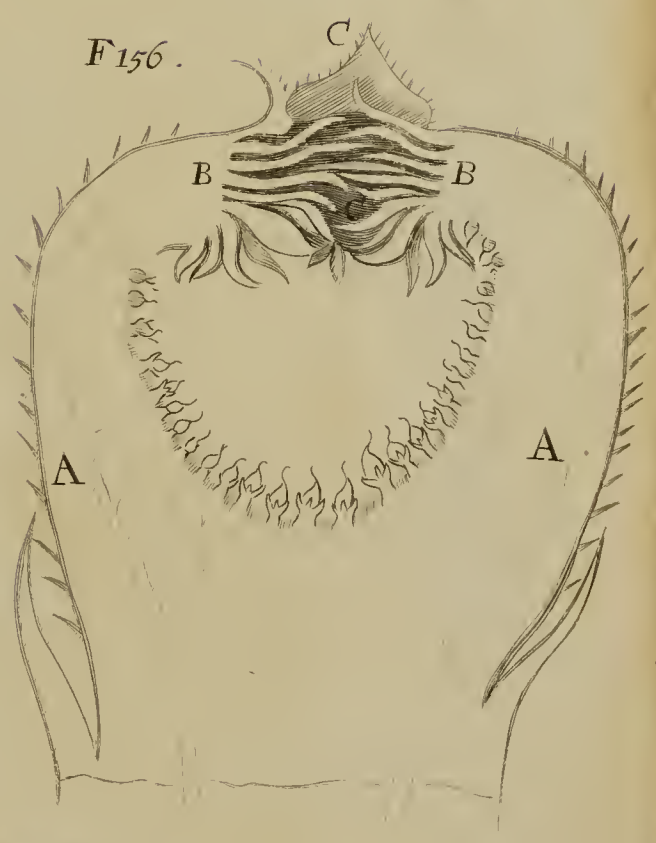

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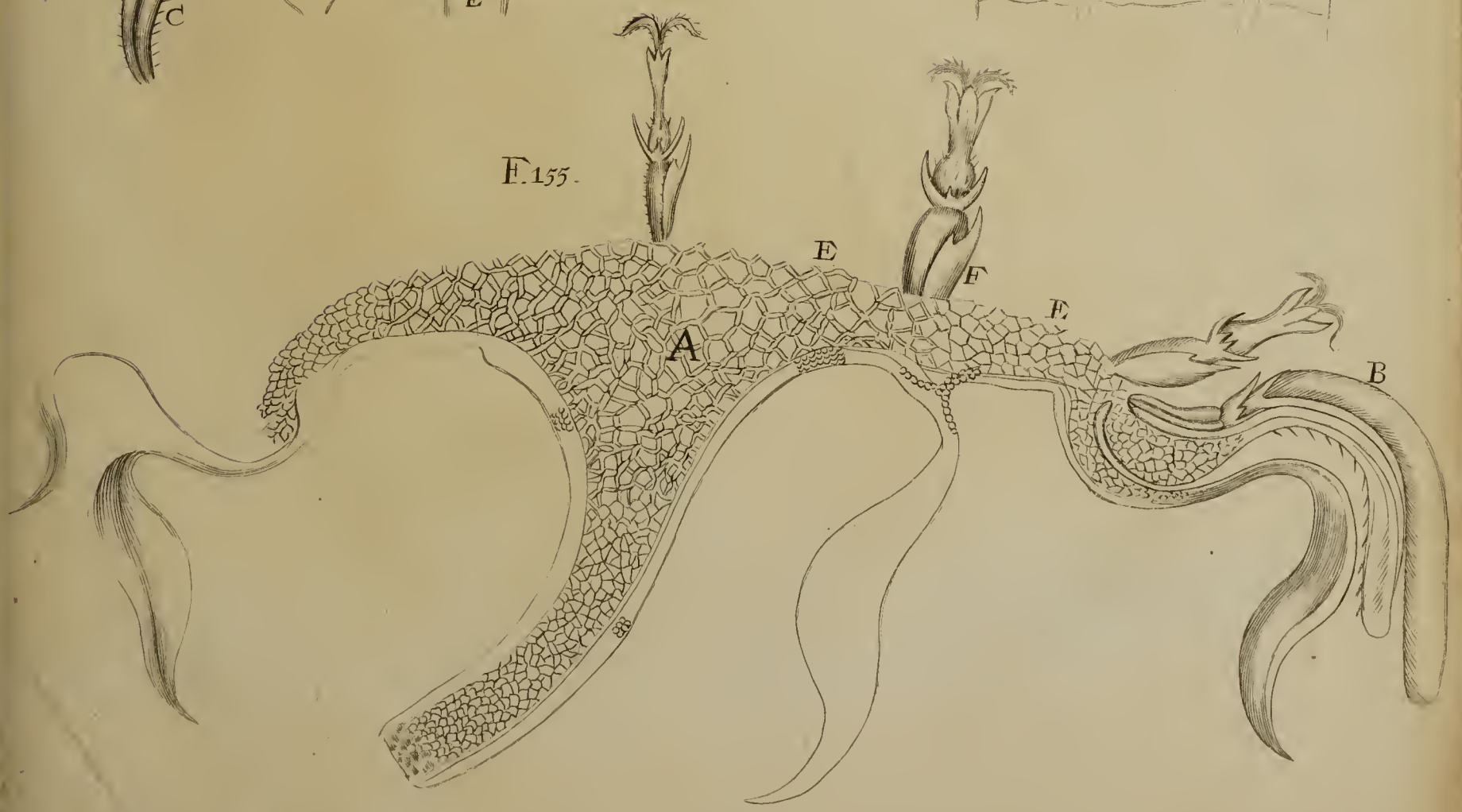

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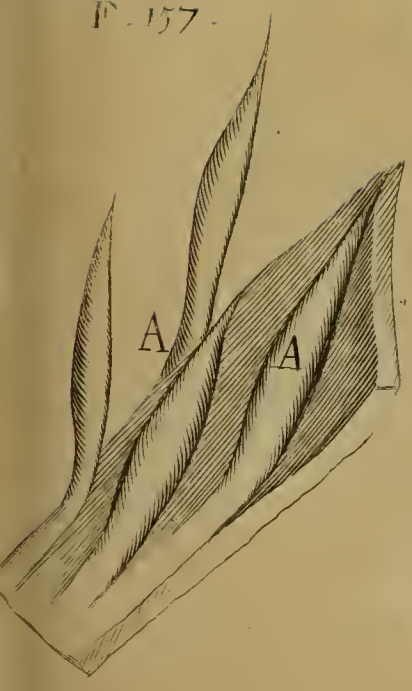

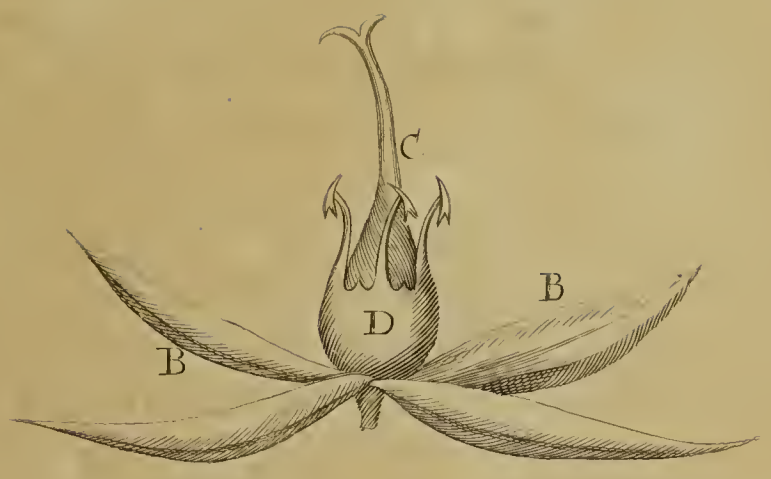

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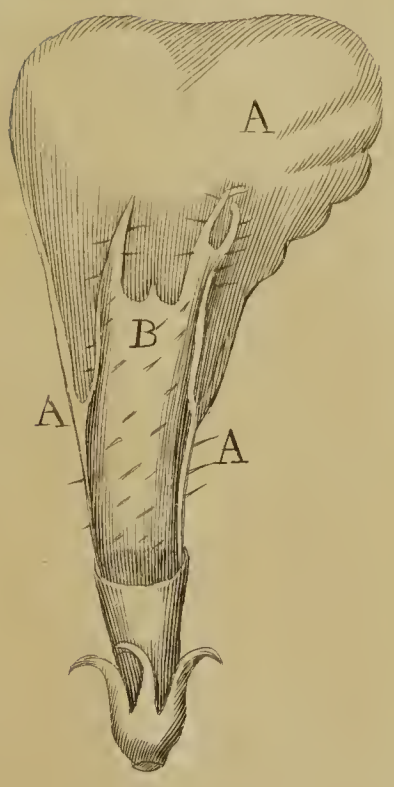

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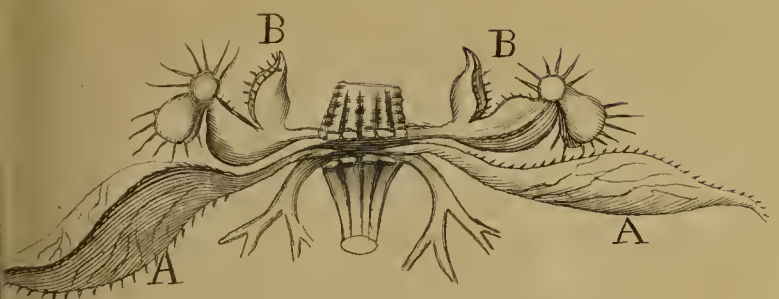

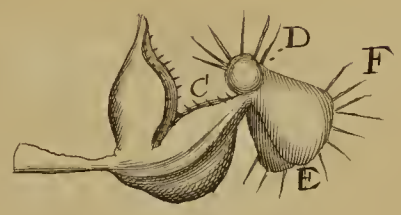

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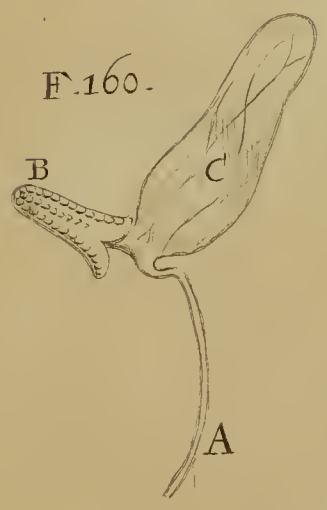

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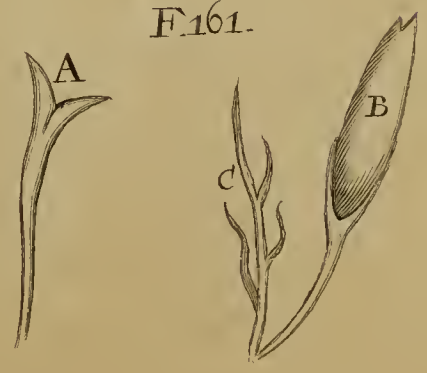

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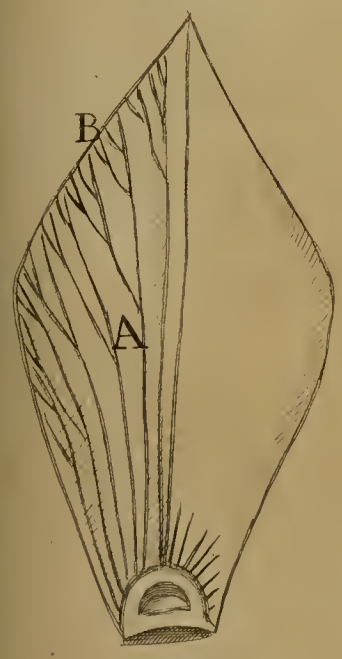

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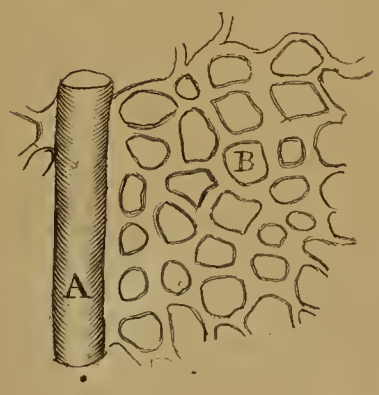

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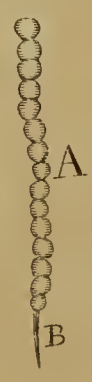

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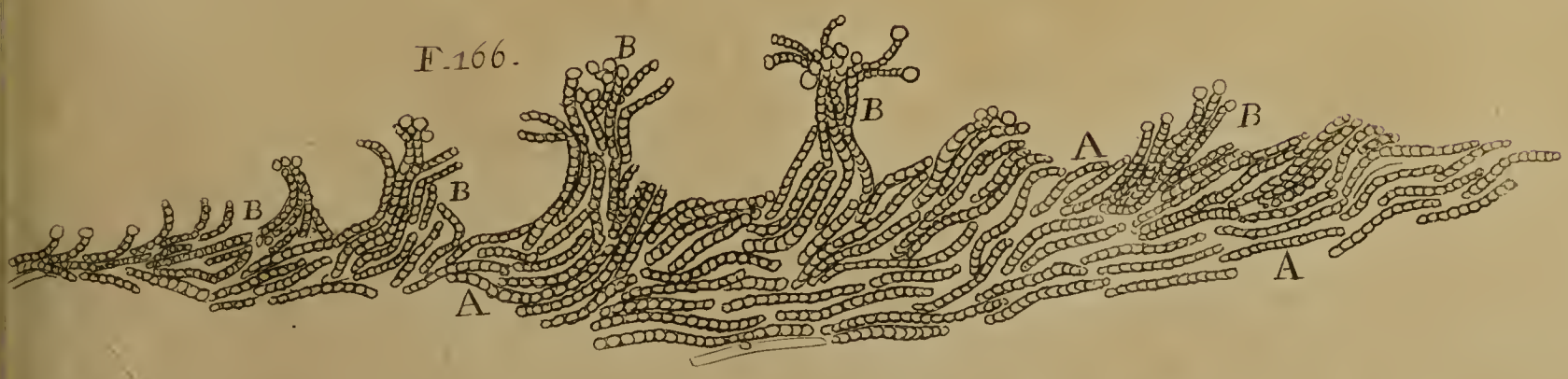


tui gemina adſtant foliola *D*, caduca & gracilia, quæ tandem collabuntur ; apex pariter, veluti excreſcens gemma, foliolis *E* condecoratur, ita ut exarata folia invicem unita florem efforment. Interdum ab eodem ſurculo *A*, rami ejuſdem naturę cum floſculis promuntur, quorum congerie flos plenus excitatur. Sectus ſurculus fibrarum productiones *F* in ſingula foliola indicat.

Ludit rurſus natura ſolitâ ſuâ munificentiâ, dum florem pluribus floſculis ita componit, ut jucundum ſpectaculum paret. Hoc in *cinara*, *heliotropio*, & *beli* miramur 153. Hujus cauliculi extremitas in globoſum extenſa corpus *A*, quod interdum depreſſius eſt, ſupra calycem primò inſigniora promit folia ſeu peculiarem floſculum, & ſtylum *B* ; horum copiâ, coronę inſtar, floris baſis ornatur. Floſculi hujus ſtructura varia eſt ; in ſimplicibus etenim, ſeminis capſula *C* depreſſa aſſurgit, à quâ folium unicum *D* rotundo exortu erumpit ; ab hujus medio, ſtyli ſeu uteri tubę *E* eminent : In aliis autem, flore pleno turgentibus, folia hujuſmodi *D* proceriora, gemina ſunt, & erumpentibus tubis *E* locum præbent. Reliquum areæ minimis floſculis *F* occupatur ; ſinguli, ſeminum loculo *G* & folio conſtant, quod in quinq; laciniatur foliola *H* ; ab hujus umbilico emergit ſtylus *I*, cujus ſtamina *K* tenent. Interiorem ſubjecti corporis ſubſtantiam utriculorum ordines *L*, in rete producti, excitant, qui diuturnitate temporis contabeſcunt. Parum abſimilis configuratio conſpicitur in *cyano* præcipuè *odoroſo* 154, cujus *calyx A*, multiplicibus foliolis contentus, aream *B* ambit ; ab hac, coronę inſtar, tubuloſa folia *C*, in hiatu laciniata *D* aſſurgunt. Reliquum areę tenent floſculi *E*, quorum baſis *F* ſemen cuſtodit & dentatis pilis *G* ornatur ; ab hac fiſtuloſum extenditur folium *H* ; à cujus hiatu, ſtyli *I* tubæ, & ſtamina erumpunt. Eandem formam evidentiùs deprehendimus in *cinara* & *heliotropio* 155, in quo caulis, dilatatus in pericarpium *A*, utriculorum rete excitatum, originem præbet, ſupra calycis folia *B*, foliolis ſeu floſculis, quibus exterior limbus coronatur. Quilibet floſculus ſeminis ſtriato loculo *C*, & erumpente concavo folio *D* excitatur. Reliquis floſculis, totam aream *E* occupantibus, loco peculiaris calycis acuminatum folium *F* adſtat, quo ſeminis loculus *G* cuſtoditur, aſſurgente pariter florali tubâ, & ſtaminibus *H*. In *ficu*, cujus flos apud Botanicos deſideratur, inversâ & oppoſitâ viâ videtur præcedere Natura ; nam, ſicut in exaratis floribus, pericarpii moles ita aſſurgit & attolitur, ut conicum vel piricale fiat corpus, quod poſtea floſculis ſeu ſtylis tegitur & cooperitur ; ita in *ficu*, elevato exteriori ungue, fit concameratio, ſtylos & floſculos continens. Floris verò foliola parum rubeſcentia, quę in *heliotropio* & reliquis extremam floralis areę oram ambiunt, in *ficu* in anguſtum compreſſa circulum, exiguum ornant hiatum, & interiora versùs expanſa, videntur inverſum producere florem. Ita aperto *tenello ficu* 156, occurrit pericarpium *A*, cujus extremitas ſurſum contracta *B*, varios foliorum ordines *C* promit, quorum figura eſt *D*, in interioribus præcipuè, in exterioribus verò *E* : Ab interiori concavitate pericarpii, ſtyli ſeu floſculi minimi *F* erumpunt cum ſeminum loculis TAB. 27.

TAB. 28. lis *G*; hi ſenſim augentur, donec creſcente pericarpio tota repleatur concameratio. Mirabilis eſt *amaranthi* flos 157, cujus cauliculi extremitas in latam criſpamq; laminam extenditur; hujus cortex in foliola *A* frequenter laciniatur : Inter hæc floſculi eminent, concavis ditati foliolis *B*, à quorum umbilico ſtylus *C*, ſtaminibus *D* circumdatus, aſſurgit.

Varias foliorum formas in *floribus* hucuſq; rimati ſumus; aliæ in ſuper penè innumeræ ſuperſunt, quibus natura ludit. Interdum folia appendicibus parum diſſimilibus donantur, ut in *Oleandro*, 158, à cujus hiantibus foliis *A*, minora foliola *B*, dentata, conſimilis naturæ, erumpunt: In flore *melanthii* 159, duplex eſt foliorum genus & ordo; inferiora enim *A* cærulea ſunt, reliquorum florum more extenſa; & in extremo ungue quaſi ſpinoſas appendices habent. Succedit alter foliorum *B* ordo, quæ longè minora ſunt & elegantiora, concava ſunt & purpurea, & patentem hiatum *C* habent: Rotundum pariter corpus *D* eminet, viride & lucidum, gemmæ inſtar, à quo bina pendent quaſi folia *E*, quorum extremitas pilis *F* conſpergitur.

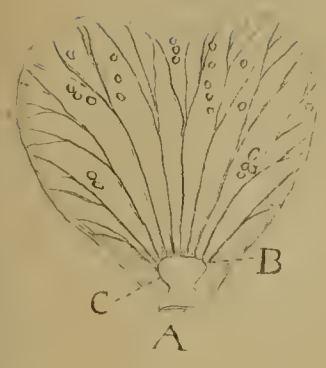
Quandoq; monſtroſa ſunt folia, & quaſi orta caſu; ita in *roſa* 160, frequenter propè ſtaminum petiolos fit mixtura ſtaminis & folii : Nam pediculus *A* eminet, cujus apicem ſtaminum capſula *B* tenet; paulo infra, pendet à latere foliolum floris *C* cum coſtulis. In *pæonia* 161, ubi multiplicantur foliorum ordines, inſolitæ formæ reperiuntur folia : Nam quandoq; in geminas angulares appendices *A* arctius deſinit folium; interdum folium ab exortu tubuloſum in hiatum *B* laxatur; non rarò, ſtyli inſtar, ſeu ſurculi, ramos *C* hinc inde promit, ſolitumq; colorem & ſubſtantiæ modum cum reliquis foliis ſervat.

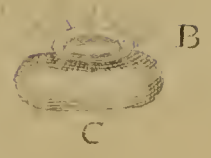
Florum folia propriâ conſtant ſubſtantiâ, hacq; multiplici, qualis in vulgaribus foliis obſervatur; ut luculenter in craſſioribus foliis, & præcipuè in *corona imperiali* 162 patet. Singulum hujus folium cuticulâ exteriùs operitur, ſub qua excurrunt coſtulæ *A*, frequenter, numero tredecim, quæ extrema versùs in ramos *B* ſubdividuntur : Singula quæq; coſtula ligneis fiſtulis & contenta tracheâ integratur; reliquum verò appenſis utriculorum ſeriebus completur. In *gladioli* 163 floralibus foliis, à coſtulis *A*, rete *B* extenditur, cui utriculi appenduntur.

Præter exaratas fiſtulas & tracheas, occurrit *Utriculorum* ſubſtantia, quâ folii latitudo & craſſities excitatur. Exteriùs varia eſt ipſorum forma & magnitudo; etenim, ſeſe invicem urgentes, ubi copioſè ſtipantur, variam ſortiuntur configurationem. Color ipſorum quoq; varius eſt. In gladiolo exteriores utriculi rubicundo ſcatent ſucco, interiores verò, albo. In foliis *pæoniæ* exterior pariter utriculorum ordo rubicundo inficitur colore; interior & centralis, ſubalbus eſt : Hoc idem in *tulipa* miramur, cujus interiora albi utriculi occupant, vario exteriùs luxuriante colore; utriculorum verò multiplices ordines nec recti nec paralleli ducuntur, ſed implicantur; unde avulſis exterioribus ſtiriis, tranſverſalium ordinum laceratorum effluens humor progreſſum indicat. Sunt autem plærumq; utriculi catenatim locati, quaſi ſtiria quædam; unde avulſo uno,

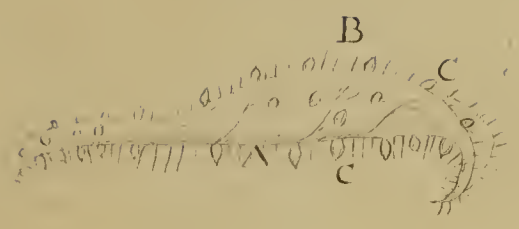
aliorum

F167.





F165



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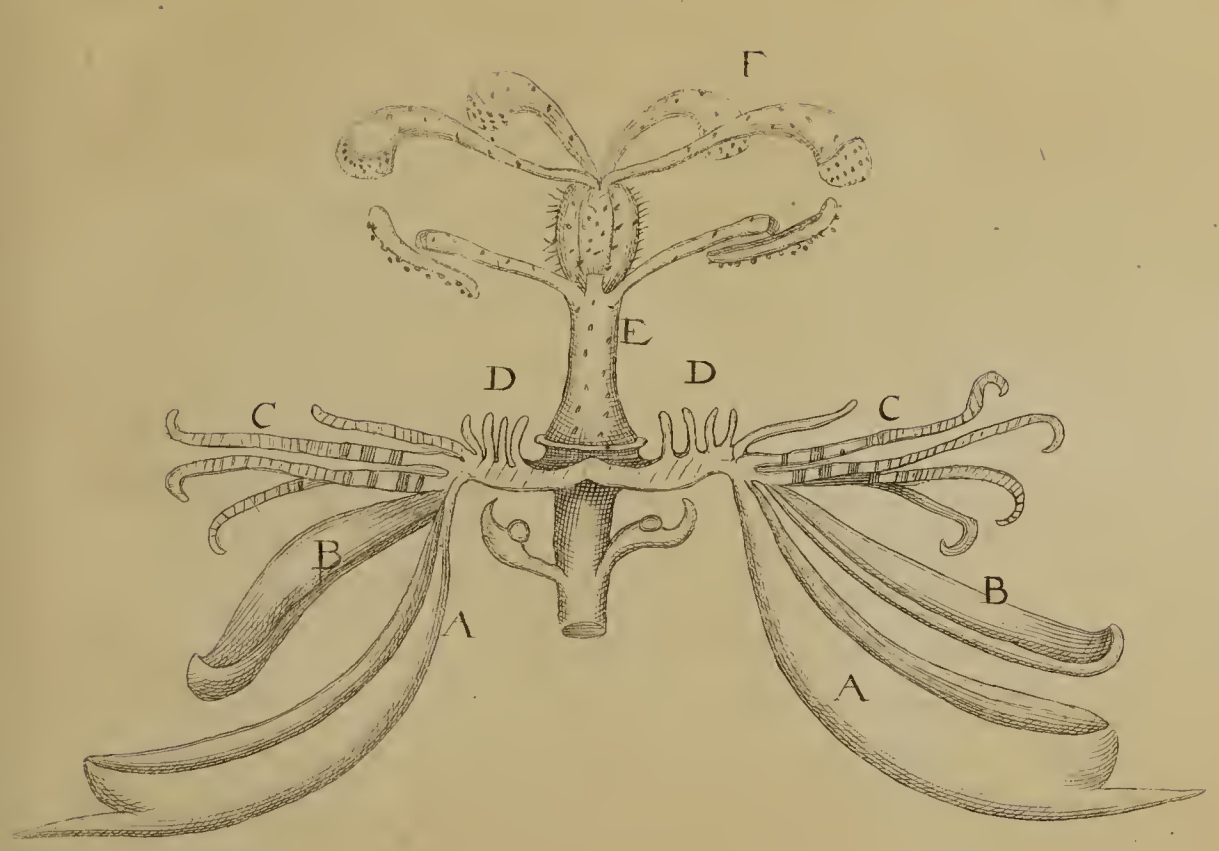
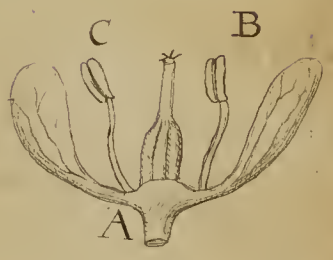


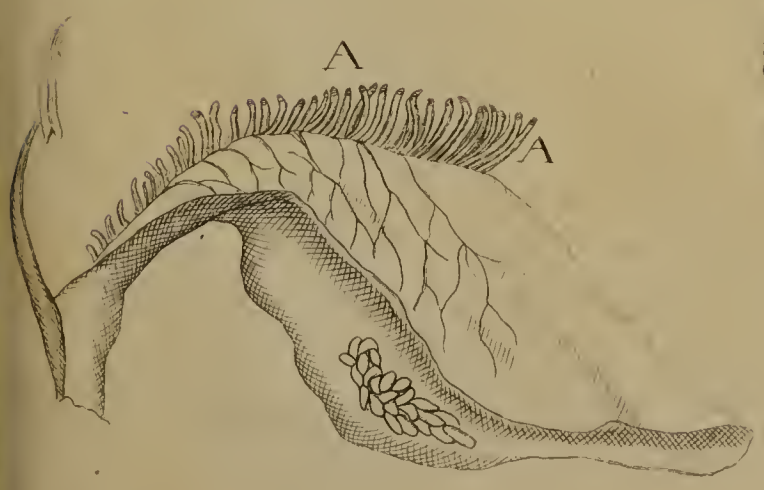
F170.

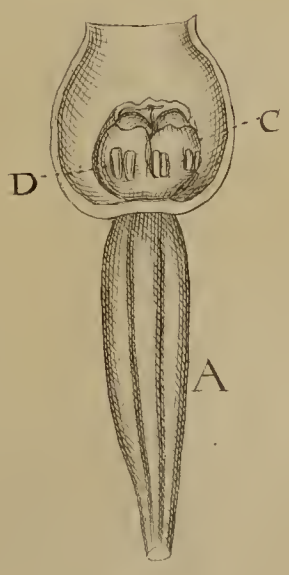
F174.



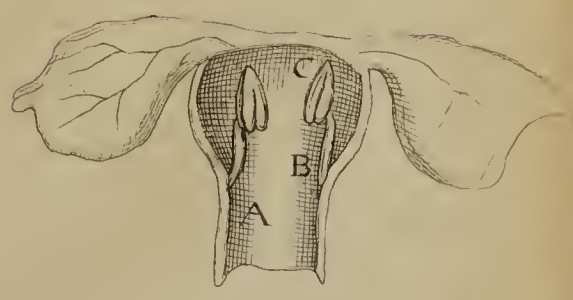
F172.

F171.



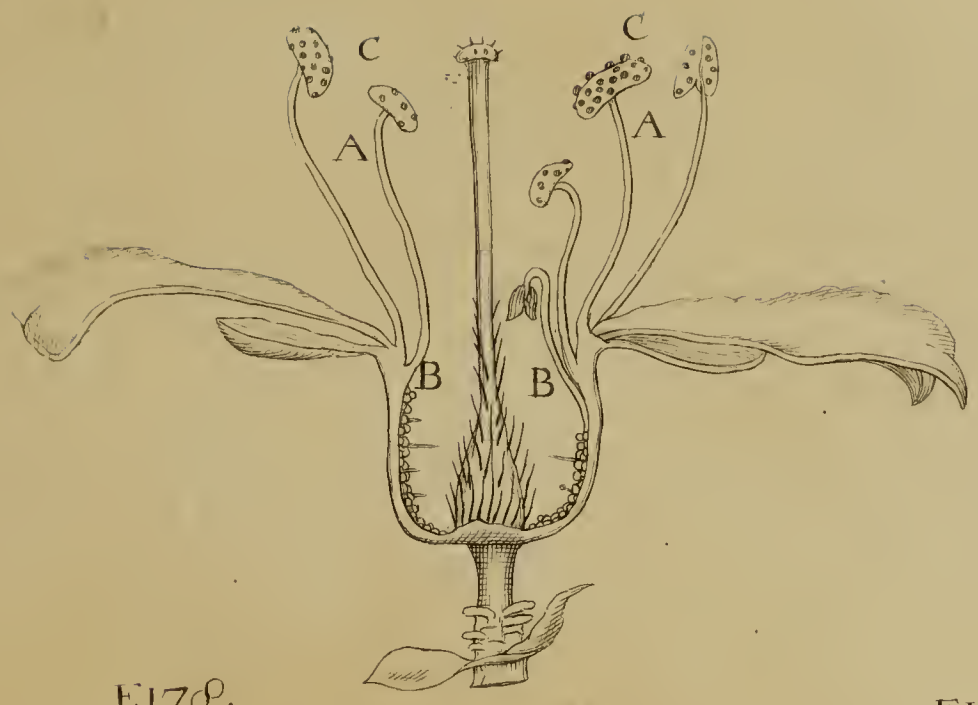


F173.



F. 175.

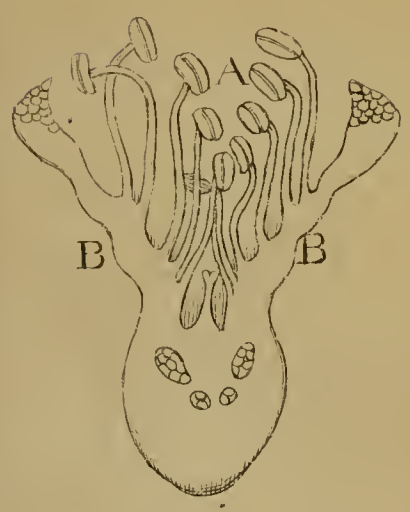
F. 176.

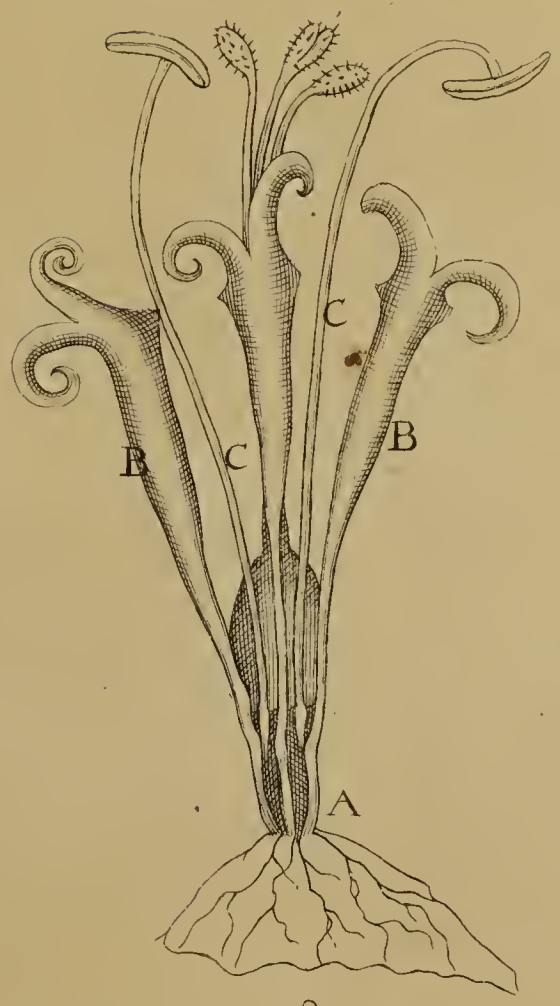


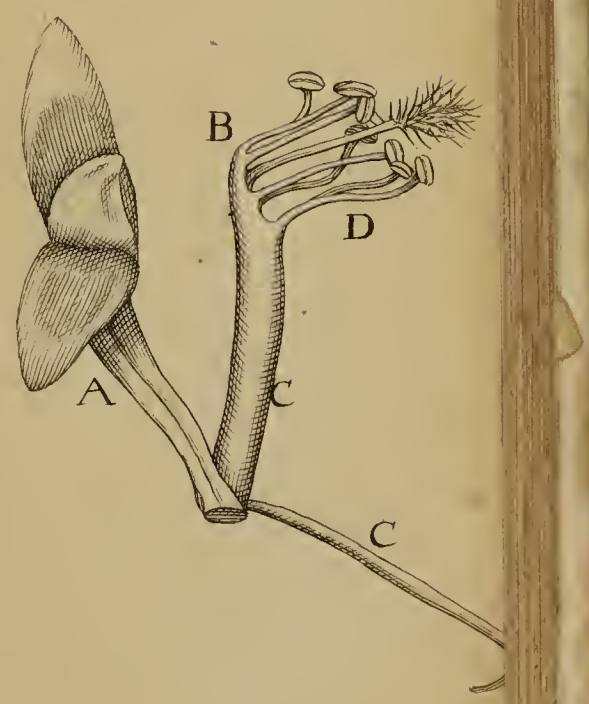
F. 178.

F. 179.

F. 177.







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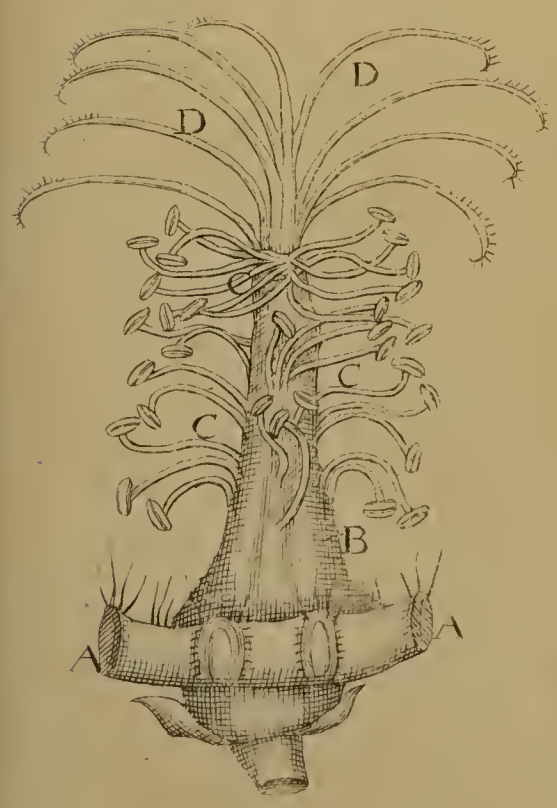
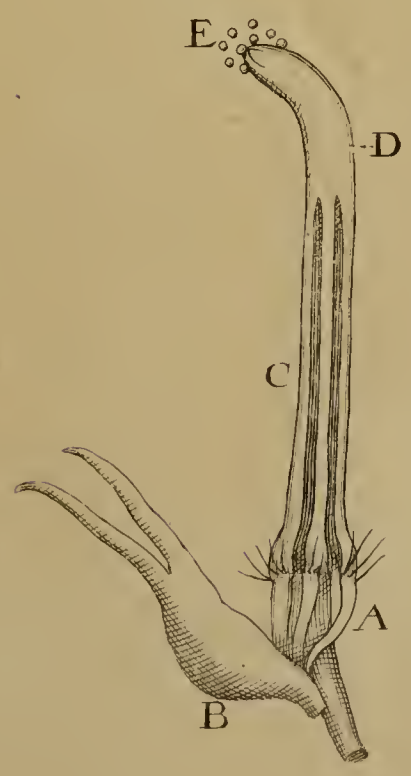
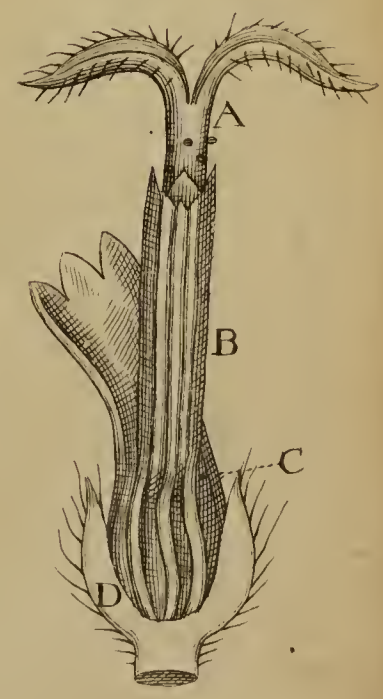


F. 181.



F. 182



aliorum ſubſequitur ordo. Hoc præcipuè in *tulipa* 164 occurrit; ablatâ namq; cuticulâ laceratione, rapitur ordo *A* utriculorum, inæqualis magnitudinis, & in apice videtur fibrę veſtigium *B* emergere. Idem licet experiri in *pæoniæ* foliis 165; quorum utriculi latiores hanc delineatam ſeriem *A* exhibent. In *lilii* præcipuè *rubri* 166 foliis, utriculorum pariter ordines deprehenduntur, quin & extra erumpunt, & patent in rubris præcipuè liliis, in quorum foliis circa exortum, interiùs, quædam attolluntur criſtæ *A*, quæ utriculorum ordinibus coagmentatæ, diſparatis finibus *B* eriguntur; & frequenter extremi utriculi, quibus criſta completur, inſigniter turgent; quod certè copioſioris alimenti argumentum extat.

Mirabile eſt, quod Natura quaſi conchas in florum foliis excitavit quibus mel cuſtodiret; ita in *corona imperiali*, *lilio Perſico* 167, & *ranunculo* miramur: In hujus interiori parte, non longè ab implantatione *A*, concha rotunda *B* obſervatur, quę melleo diaphanoq; ſemiconcreto repletur ſucco: Hanc mirè cooperit velabrum *C*, hìc revulſum. In *corona imperiali* fovea hæc exteriùs labio circumambitur, & deorſum pendulæ ſemiſphærica appenditur gutta. Interdum dubitavi, an tenuis quædam adſit membranula, contentum icorem coercens, ne deorſum effluat; applicito tamen digiti extremo, à fovea rapitur, ſicut accidit in reliquis aquæ & fluidorum guttulis, quæ ſuſpenſæ pendent. Hinc meditari poſſumus, melleam hanc ſubſtantiam non exterius advenire, ſed ex ſucco intimiùs concocto hujuſmodi congeri materiam. In *digitali* pariter propè umbilicum melleæ ſubſtantiæ aliquot guttæ recolliguntur. TAB. 29.

Quibuſdam inſuper florum foliis, fungos & capſulas quaſdam, terebinthinam fundentes, addidit Natura; quod præ cæteris eluceſcit in flore *dictamni albi* 168, qui ſpecioſiſſimus eſt. Hujus folia numero quinq; excurrentibus coſtulis *A*, pervaduntur; in exteriori verò parte, & circa unguem, pili *B* copioſi eminent, inter quos capſulæ *C* quædam ſituantur, terebinthinam fundentes. Parum abſimili formâ contegitur *horminii* & *ſclareæ* folium, quod pilis & fungis *D*, glutinoſum fundentibus icorem, tegitur, ita ut, ſi leviter etiam pertractetur, digitis vehementer hæreat.

Ulrtâ floris folia, quorum deſcriptionem ex diverſis deduximus floribus, ſolet ulteriùs Natura in aliquibus floribus graciliora addere *capillamenta*, diverſæ, inquam, magnitudinis: Hæc luculenter patent in *maracot Indorum* 169, in quo, ultra folia calycis *A* & floris *B*, capillaria quædam filamenta *C* obſervantur, coronæ inſtar, interiorem floris partem occupantia; hæcq; exortum à dilatato pediculo cum foliis *B* ſortiuntur: Ipſorum color varius eſt, in diverſis ſuis portionibus. Non longè ab horum implantatione plures conſimilum foliorum ordines *D* manifeſtantur, exiguæ tamen longitudinis: Ab horum centro elegans ſtylus *E* cum appenſis ſtaminibus *F* aſſurgit. In *cucurbita* interiùs 170 flores & amentum plurimis filamentoſis appendicibus ornantur; hæ utriculorum ſerie *A* coagmentantur. In *iride* 171, multiplicia ſunt floris folia, violacei coloris,

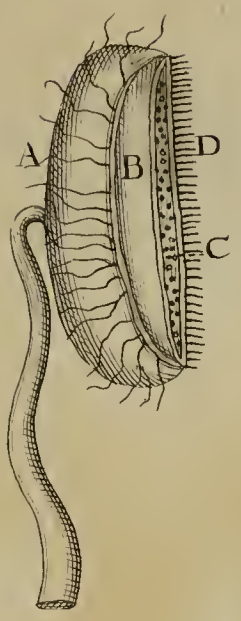
majora

majora tamen capillitium *A* interiùs emittunt â ſitu excurrentis coſtulæ : Singulum filamentum hoc, vitellinum refert colorem, capituloq; *B* ornatur, & utriculis oblongis ſeriatim poſitis *C* componitur.

Inter cæteras partes, quibus flores integrantur, *ſtamina* non ultimum ſortiuntur locum. Hæc igitur varia ſunt, penes numerum, figuram, & exortum ; unde principaliora recolligentes, à ſimplicioribus exordiemur. In *ariſtolochia longa* 172, ſupra ſeminum loculos *A*, ſubrotundum corpus *C* excitatur, in quo fixa hærent, abſq; pediculo, ſtaminum lutea capitula *D*, quæ hiando globulos fundunt. In *narciſſo*, *hyacintho*, *gladiolo albo*, *digitali*, & ferè omnibus habentibus tubuloſa folia, ſtamina brevi petiolo à floris folio emergunt ; quod apprimè patet in *primula veris* 173, in qua à parte interioris folii *A* erumpunt ſtamina brevi firmata pediculo *B*, quorum apicem luteum tenet capitulum *C*. In quamplurimis verò, non à floris folio, ſed à communiori principio, à dilatata ſcilicet petioli ſubſtantia, quæ folia & ſtylum profert, ſingulari exortu pullulant : Ita in *vite*, & *lilio Perſico* 174, à cujus concava & humiliori parte *A*, quæ ſtylum ambit, ſtamina *B* numero quinq; aſſurgunt, quæ in capſulas *C*, vitellinis globulis turgentes, deſinunt. In *piris*, & *meſpilis* 175, ſtaminum exortus *A* ferè horizontalis eſt ; in *prunis verò*, *ceraſo*, *oxiacanta*, & *amygdalo* 176, copioſa ipſarum ſtamina *A*, ab hiante calycis ſubſtantia *B* erumpunt, proprioq; condecorantur capitulo *C*. Parum diſpari ritu idem in *malo Punica* 177 mirari licet, in qua ſub diverſis ordinibus ſtamina *A* à craſſioribus calycis foliis *B* ſeſe exerunt. In aliquibus, licèt ſtaminum exortus diſtinctus ſit, à communi tamen zona ſeu circulo, ſtylum inveſtiente, implantationem ſortiuntur : Hoc patet in *lino*, *githagine*, & *been albo* 178 ; à petiolo ſtriatum corpus *A* attollitur, ſtylum ambiens ; hujuſmodi in folia *B* quinque, & ſtamina *C* laciniatur. In *ſiliquaceis* plerumq; ſtamina quidem brevia ſunt, ſed à longiori quaſi capſula, ſtylum circumdante, erumpunt : Hoc eluceſcit in *piſis*, *cicere*, & *fabis* 179, in quibus, revulſis foliolis *A*, oblongum & fiſtuloſum exeritur corpus *B*, quod tribus conſtat integrantibus corporibus *C* ; ejus autem extremitas in ſtaminum pediculos *D* dividitur. In *arboreſcente malva* 180, à floris umbilico *A*, tubuloſum corpus *B* aſcendit, quod, ſurculi inſtar, multiplices ſtaminum petiolos *C* promit ; interior autem concavitas ſtylo occupatur, ejuſq; tubæ *D* eminent. Staminum ſtructura in *cyano* 181 longè diverſa eſt ab exaratis ; nam petioli quinq; *A* ab interiori floris ſubſtantia *B* ſurſum producti, & uniti, cæruleum tubum *C* efformant, quo ſtyli tuba *D* cuſtoditur ; in apice autem crenis exiguis ſolvitur, emergentibus ſtaminum globulis, qui inter tubam & ſtaminum capſulam *E* conduntur, veluti in propria capſula. Hoc idem evidentiùs in *cinara*, *heliotropio*, & ſimilibus 182 occurrit ; horum etenim aſſurgens tuba *A*, ſtaminum capſulâ *B* ambitur, quæ quinq; petiolis *C* tubuloſo corpori *D* adnaſcitur : In capite autem laciniatur, & interiùs ſulcos habet, quibus globuli recolliguntur, & elon-
TAB. 31. gatâ tubâ rapiuntur. *Brancæ urſinæ* inſignia ſunt ſtamina 183, quorum capitulum ſubviridi craſsâq; conſtat ſubſtantiâ *A*, à qua ſtaminum loculus *B*

enaſcitur,

F. 183.



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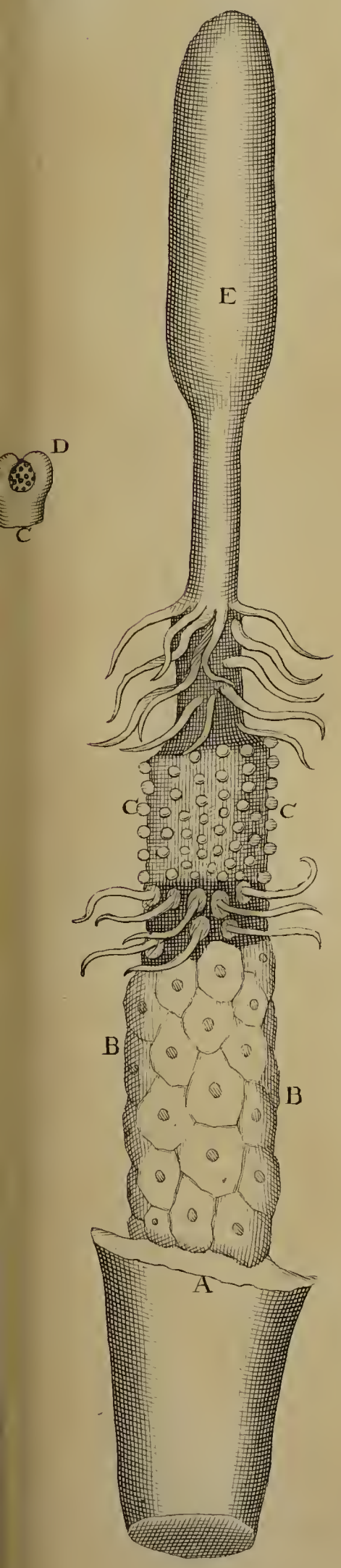

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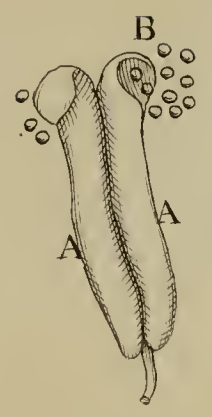

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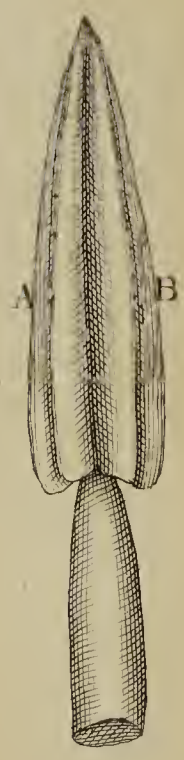

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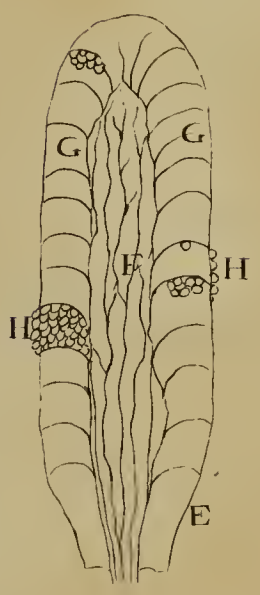

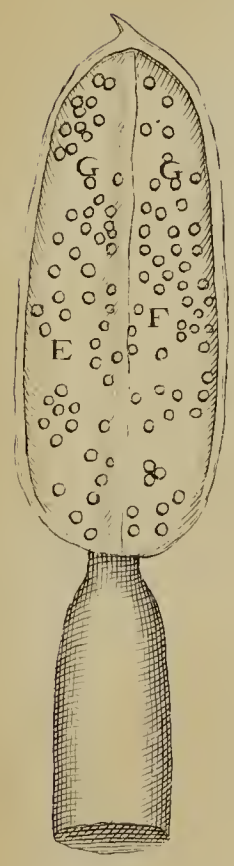

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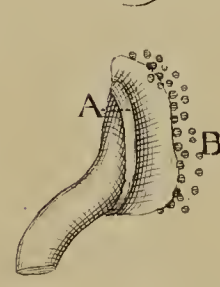

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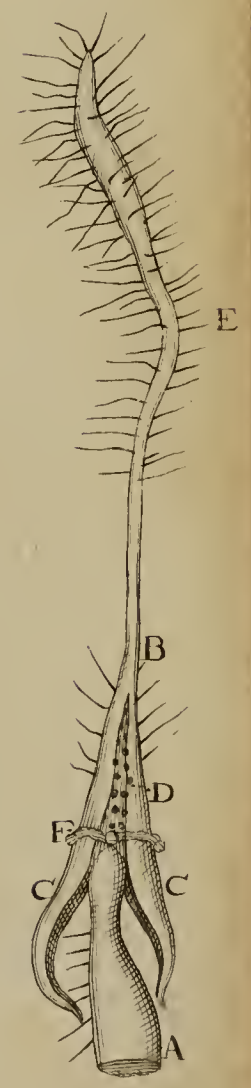

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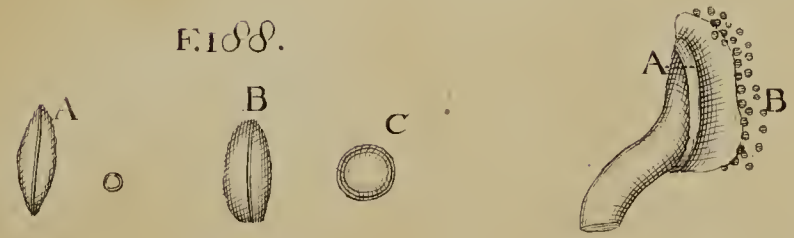

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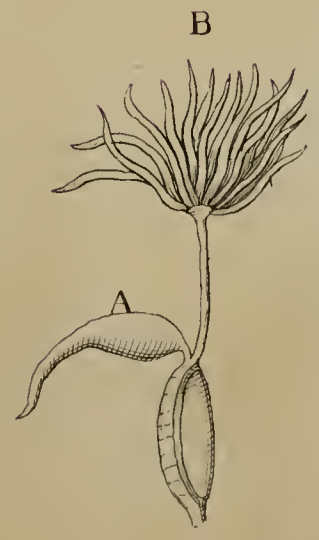
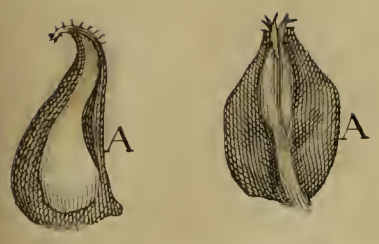


Fig 191.



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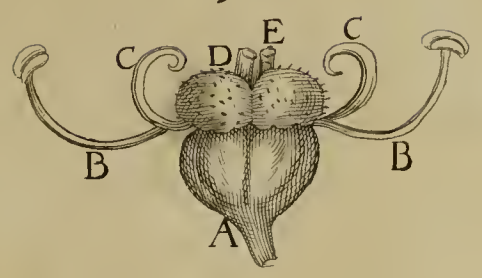

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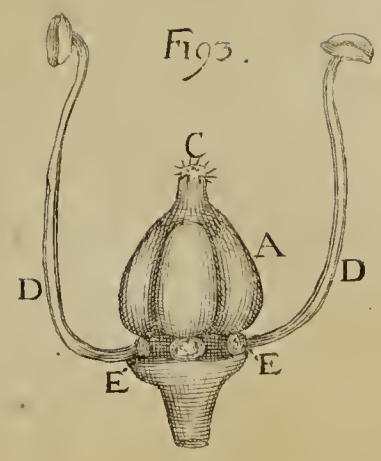

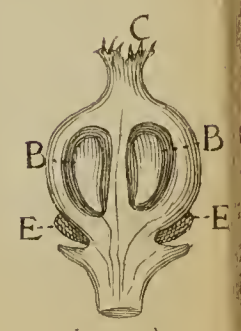

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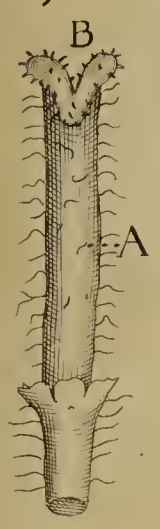

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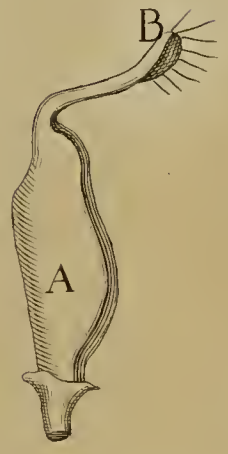

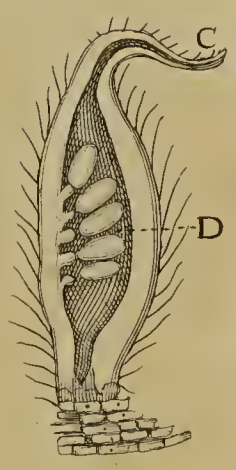

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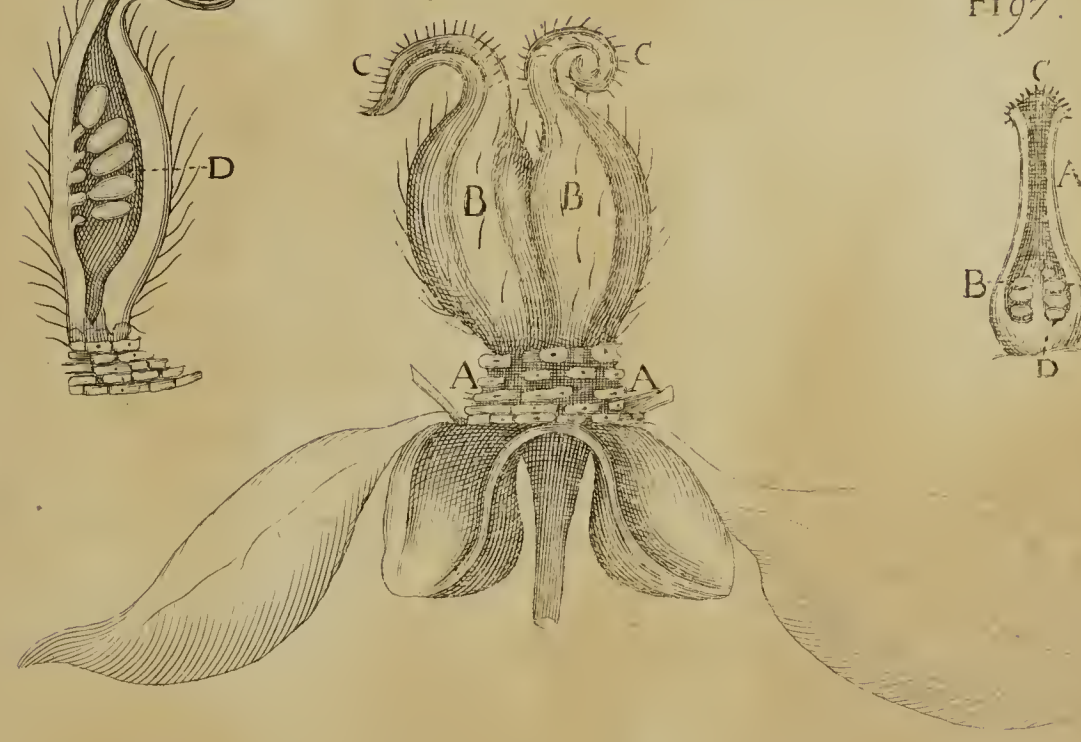

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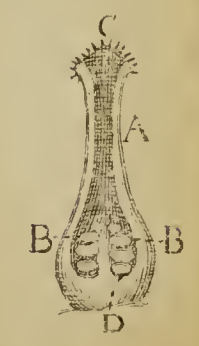
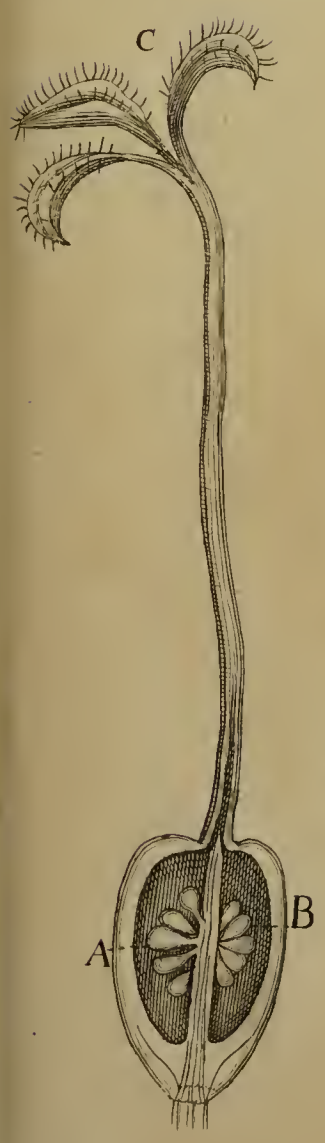


Fig 198.

Fig 201.



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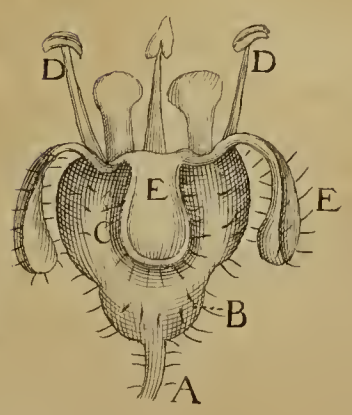

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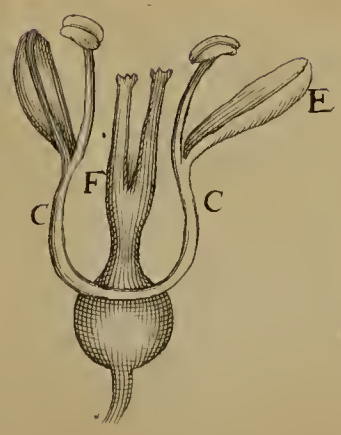
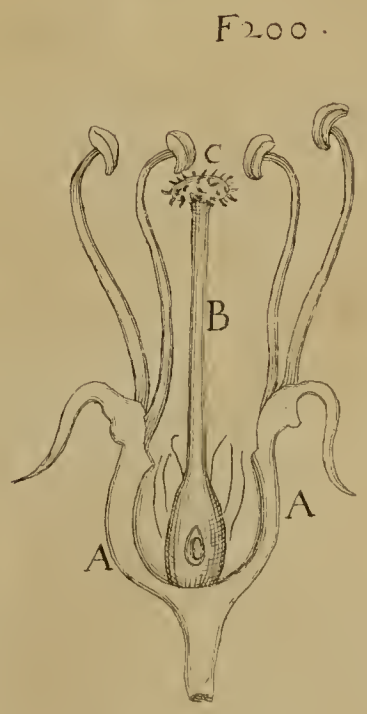
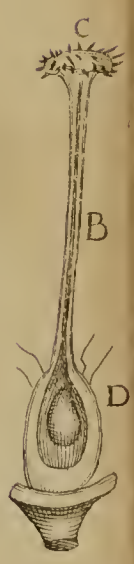


Fig 200.





enaſcitur, per longum hiatus *C* aperitur, quo patente, ſtamina effunduntur; ab hoc pili *D* emergunt. In *aro* 184, inſigne eſt ſtamen; à cauliculo ſupra calycem *A*, qui totum ambit florem, plura ſeminum inchoamenta ſeu floſculi *B* eminent, qui tandem, exareſcente pericarpio, turgent, & ſemina fovent; ſuperiùs erumpunt ſtyliformes appendices, ſupra quas exigua quædam turgent corpora *C*, quæ geminis quaſi foliis *D* componuntur, quibus lutei quidam orbiculi, veluti ſtamina, continentur; tandem oblongum attollitur luteum corpus *E*, globulis excitatum; hujuſmodi per longum, rectum, concavum eſt, ſoliſq; ligneis fibris *F*, reticulariter implicitis, occupatur; reliquum verò ligneis fiſtulis *G*, in globulorum congeriem *H* productis, pervaditur.

Turgentibus orbicularibus corporibus, quibus ſtaminum capitula replentur, exſiccatâq; continente capſulâ, foras prodeunt globuli minimi, & diſperguntur. In *tritico Indico* 185 gemina capſula *A* obſervatur, in cujus ſummitate excitatum foramen *B* globulis exitum præbet. In *tulipa* 186, ſtaminum capita geminâ capſulâ *A*, *B*, coagmentantur; horum ſingula non continuatâ & interruptâ conſtant membranâ, concavitatem efformante, ſed geminæ partes *C*, *D*, reflexæ, introcurvatæ, & per harmoniam unitæ, continentem efformant concavitatem; hæ diductæ *E*, *F*, & extra patulæ, contentis globulis *G* liberum præbent exitum. Idem accidit evidenter in ſtaminibus *oleandri* 187, quæ craſſiori petiolo *A* ſubrotundo donantur, à quo angularis quædam capſula *B* aſſurgit; hæc, diductis & hiantibus hinc inde tunicis *C*, rotundi globuli *D* fiunt in propatulo; comata inſuper, pilis albis conſperſa, attollitur appendix *E*; ab apice pedioli *A* albus quidam mucus effluit *F*, qui glutinis inſtar hæret.

Staminum corpus, cujus formam hucuſq; retulimus, petiolo, & appenſâ capſulâ conſtare videtur; ſingula tamen hæc ligneis fiſtulis & tracheis integrantur, quibus utriculi per longum locati adduntur; quare, cùm in galeatis, & quibuſdam etiam aliis, ab elongatis floralibus foliis producantur, iiſdem etiam particulis neceſſariò excitantur.

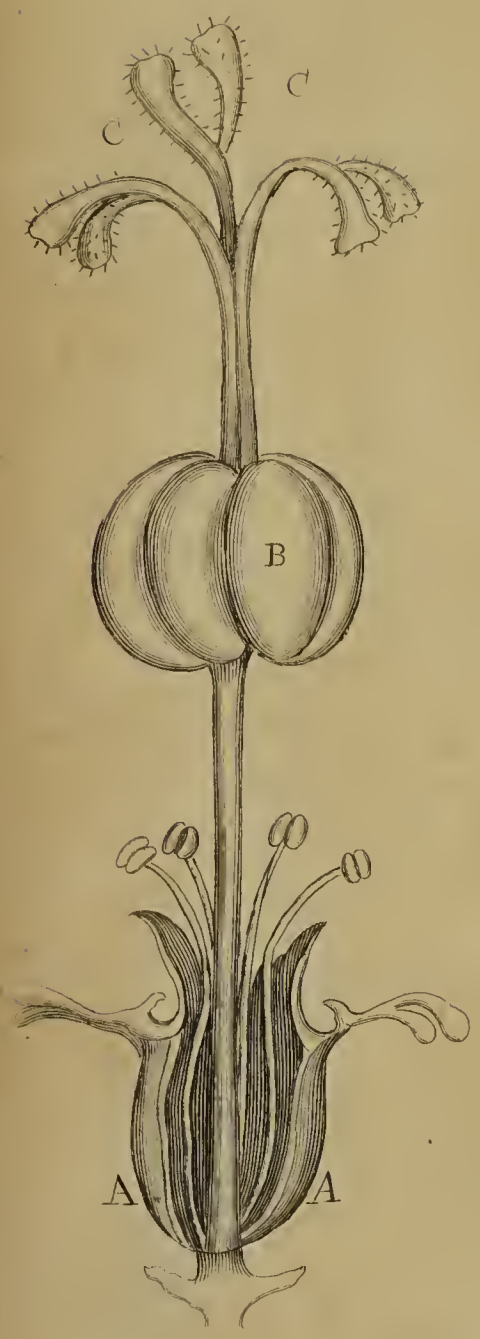
Stamineos loculos, globulorum congerie, quaſi atomorum, turgere diximus: Hi diversè configurantur, & colorantur, frequentérq; luteum ſapiunt colorem, ut in *lilio*, *roſis*, & *limoniis malis*; albeſcunt verò, diaphaniq; ferè ſunt in *malva*, & *plantagine*. Diversâ pariter donantur figurâ in *lilio croceo*, *montano albo* 188. Ovali pollent formâ *A*, parum tamen acuminatâ, & per longum, *tritici grani* inſtar, ſulco quodam excavatâ. Intra ſacculum autem concluſi, dum adhuc molles ſunt, minus angulares videntur. Horum materiam ab intimiori pediculi ſubſtantiâ percolari probabile eſt; nam in *cucurbitæ* 189 floribus, fibroſum & pluribus fiſtulis contextum corpus *A*, globulorum capſulæ ſubſternitur, cujus miniſterio confluens ſtaminum materia in globulos *B* percolatur. Huic lucem ferre videtur *branchæ urſinæ* ſtaminum craſſum corpus, à quo in contiguam capſulam globulorum materia ſeparatur.

In aliquibus plantis ſtaminum loco corpora quædam, plumarum inſtar, aſſurgunt, quæ paſſim obſervantur in *lapacio*, *acetoſâ*, & *pimpinellâ* 190, cujus flos, quaſi floſculorum racemo, integratur. In horum itaq; indagine, non in ſingulis floſculis ſtamina cum capitulo occurrunt, ſed horum loco quaſdam appendices, circa racemi apicem præcipuè aſſurgentes, intuemur. In his itaq; ſupra floris folia *A*, appendices *B*, veluti inſectorum antennæ, eriguntur; hæ comato pollent capitulo, ſingulaq; particula filamentoſa, folii *cupreſſûs* inſtar, brevibus quaſi foliolis, rubicundi coloris, conſtat.

Florum partes, quarum ſtructuram hucuſq; ſcrutati ſumus, in gratiam ſtyli ſeu uteri fabrefactas eſſe notum eſt; in hoc enim ſemen, quod ultimò à natura expetitur, affabrè cuſtoditur. *Stylus* igitur pars eſt, centrum floris occupans, quæ concavitate ſemen fovens, appendicè aſſurgit, luditq; inter ſtamina. Hanc *uterinis tubis* analogam eſſe, exaranda fortaſſe indicabunt. Simplicior itaq; *ſtyli* forma occurrit in flore *Adonis*. Hic multiplex eſt, & ſimul congeſtus pini fructum æmulatur. Unuſquiſq; uterus 191 lato conſtat corpore *A*, quo concluſum fovetur ſemen, & bre-
TAB. 32. vi hians tubâ, pilis ſeu mollibus fiſtulis conſpergitur. In *hortenſi* pariter *fæniculo* 192, copioſi obſervantur uteri, quorum corpus *A*, modicè ſtriatum, ſtaminibus *B*, & foliolis *C*, exortum præbet; ſummitatem verò ſeu aream occupat lenticulare corpus *D*, profundâ ſciſſurâ ſolutum; hujuſmodi ſubluteis mollibuſq; compaginatur fiſtulis, quæ terebinthinam fundunt: *A* medio geminæ & breves emergunt tubæ *E*. Pari progreſſu incedit natura in *uvarum* flore 193; in hoc ſtylus *A* aſſurgens ſeminum loculos *B* deſignat, & brevi attollitur tubâ *C*, ſolitis condecoratâ pilis. Circa baſim non longè à ſtaminum *D* eruptione, fiſtularum congeries *E*, terebinthinam fundentes, eminent. In *violis*, rubicundis præcipuè, 194, ſtylus *A* cuſtoditur, qui tandem in ſiliquam excreſcit, quæ hiante tubâ *B* conſperſa fiſtulis terminatur. In reliquis verò ſiliquâ donatis oblongior eſt uteri tuba, ita paſſim in *piſis*, *fabâ*, *orobo*, & *cicerculâ* 195, cujus uterus *A* fiſtuloſus ſeminum inchoamenta tuetur, tubaq; *B* exporrigitur, pilis conſperſâ. *Pæoniæ* 196 geminus eſt uterus, quaſi ſiliqua; ſupra enim varios foliorum floris exortus *A*, duplex aſſurgit ſtylus *B*, curvatis tubis *C*, quæ hiantes exterius pilis cooperiuntur, intus verò plura cuſtodiuntur ſemina *D*. Amplior in *lilio convallio* 197 eminet tuba *A*, quæ à concavo aſſurgens utero *B*, ſolito donatur capillitio *C*, in baſi verò ſeminum congerie *D* fovetur. Elegans pariter in *malo aurantiâ*, *limoniâ*, & conſimilibus, occurrit ſtylus 198, circa cujus exortum, luteum figitur corpus *A*, longiori conſtans tubâ *B*, quæ hiante capitulo donatur; totus ſtylus turgentibus oleo veſiculis *C* conſpergitur. *Uvæ ſpinæ* 199 uterus non minori artificio excitatur: Supra pediculum floris *A*, uteri corpus *B* prominet, à cujus ſubſtantiâ concavus calyx *C* emergit, qui in extremo ungue ſtamina *D*, & folia *E* promit; aſſurgit autem bifurcata tuba *F*, quæ cum uteri concavitate *G*, ſeminibus refertâ, communicat. Pari progreſſu Natura *mali Perſicæ*, *amygdali*, *pruni*, & ſimilium uteros molitur: In *ceraſo*

etenim

202.



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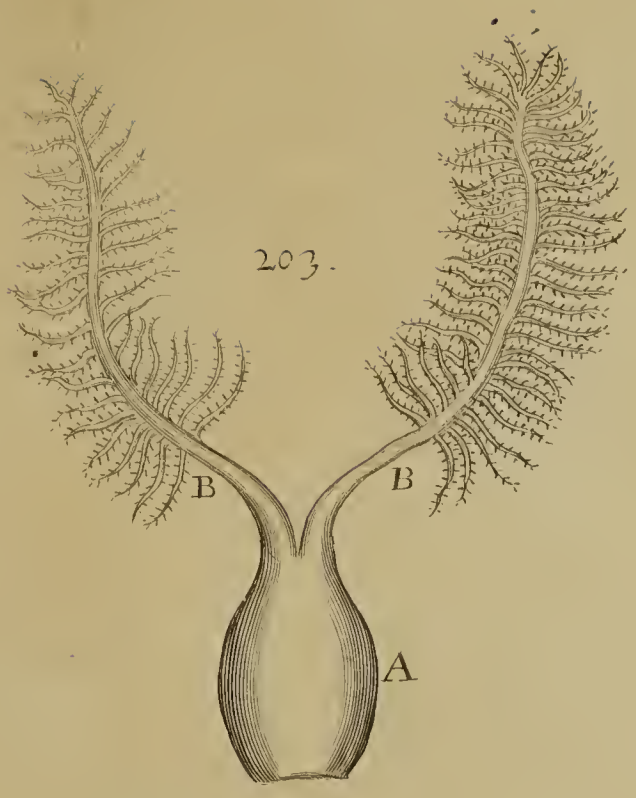

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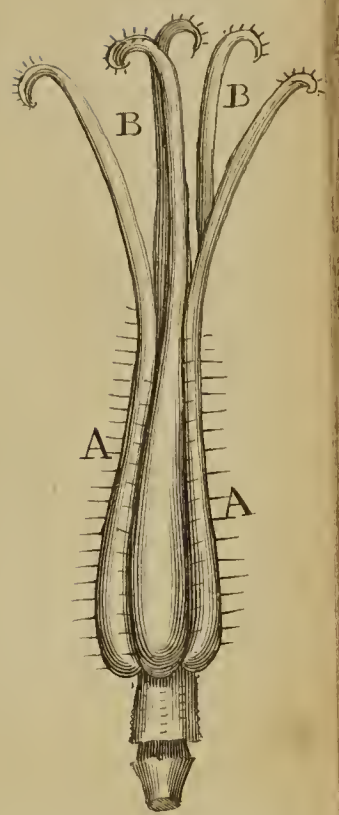

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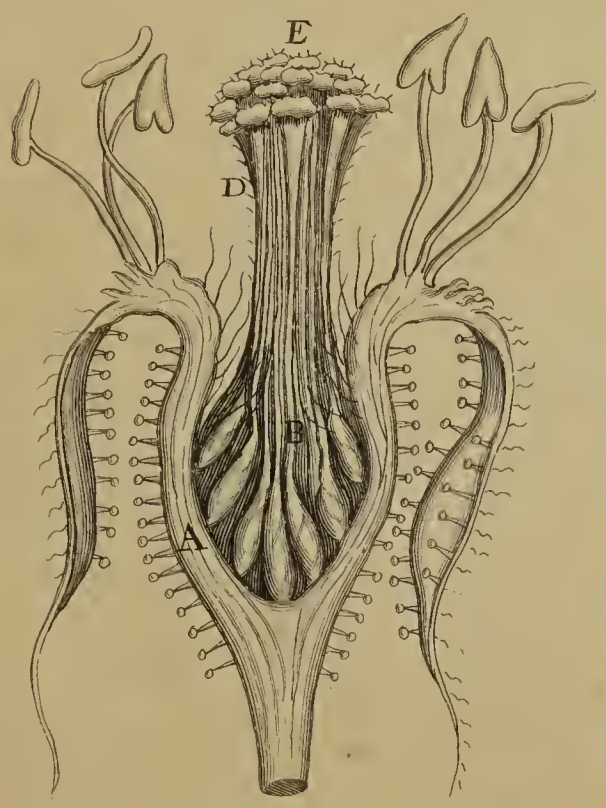

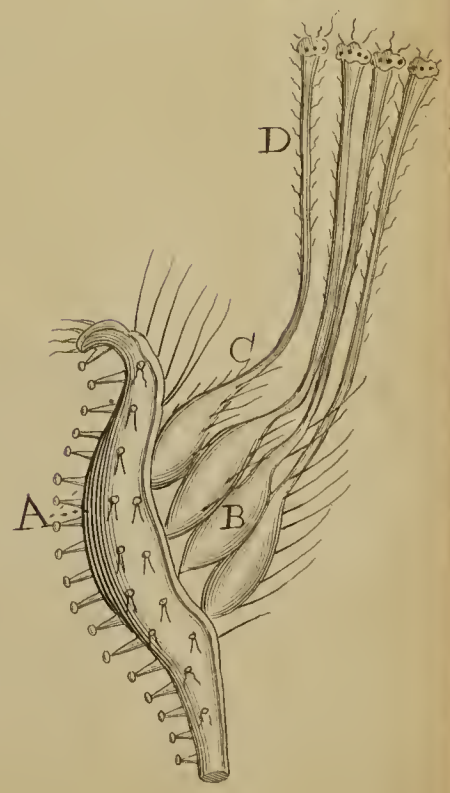

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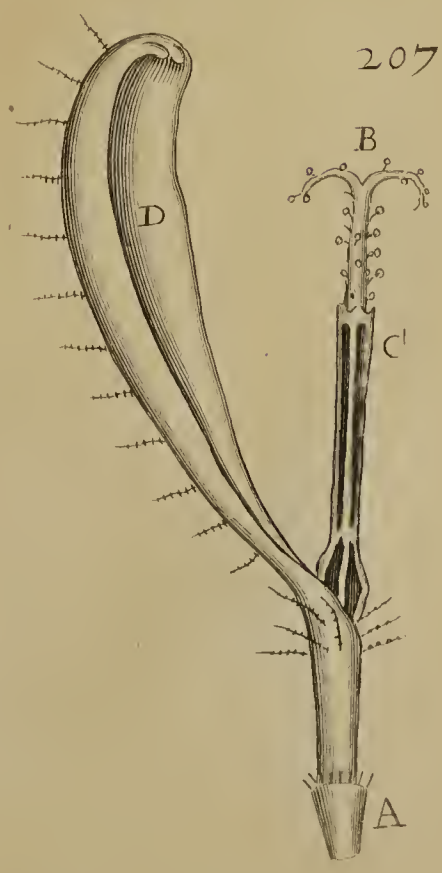

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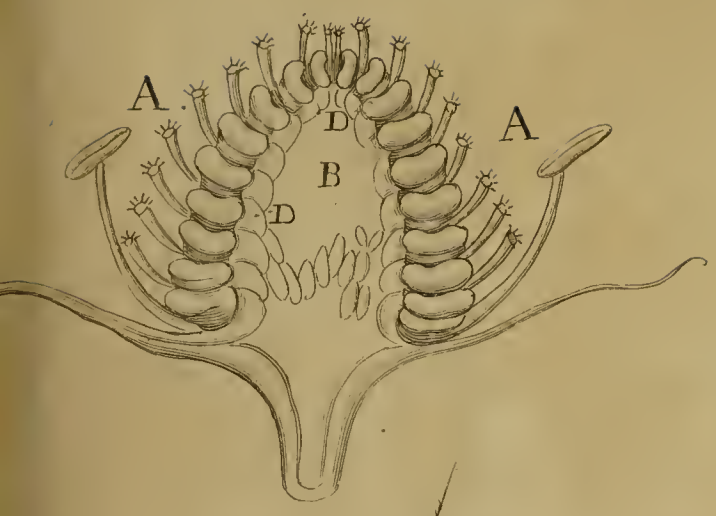

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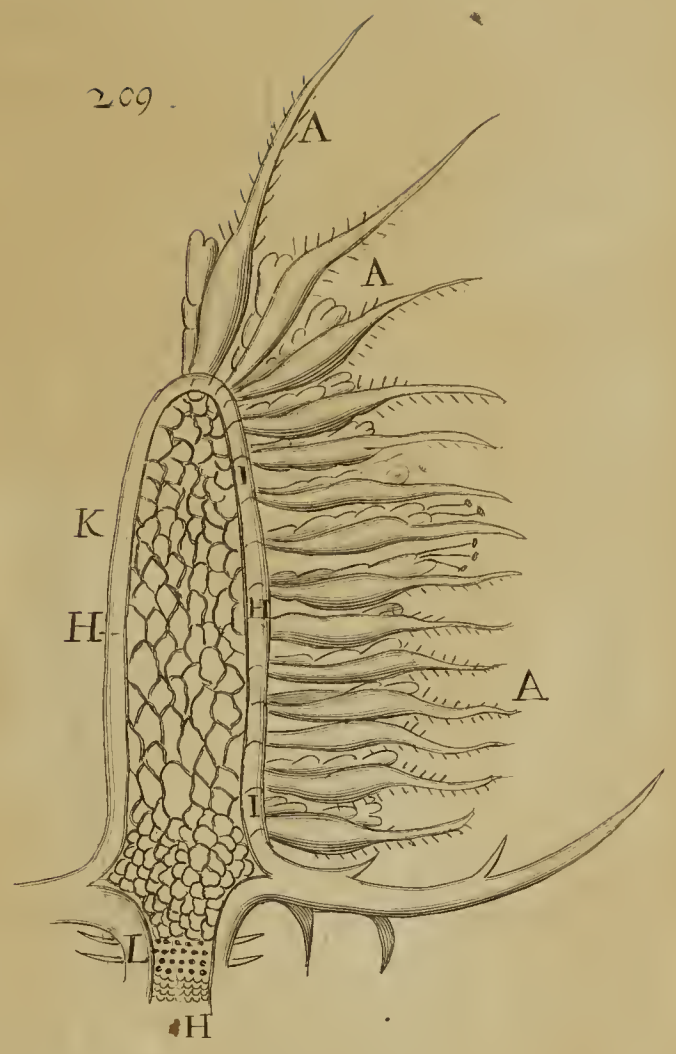

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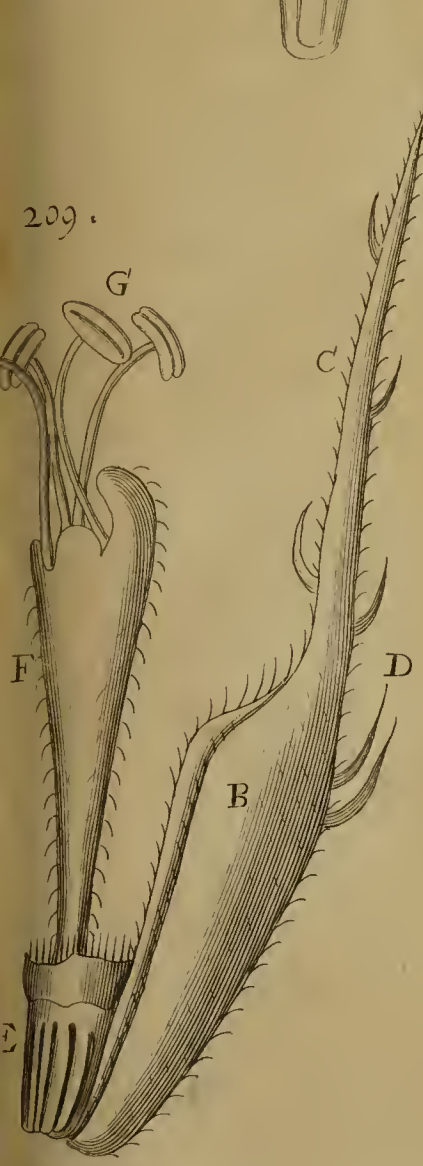

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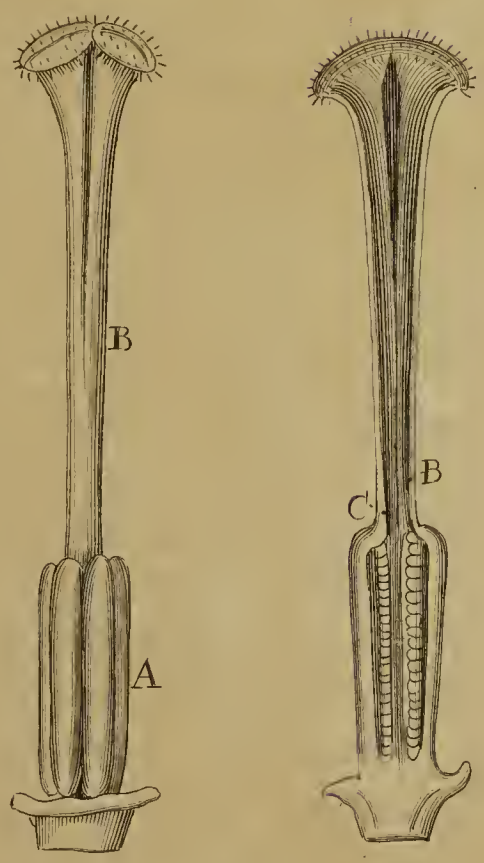

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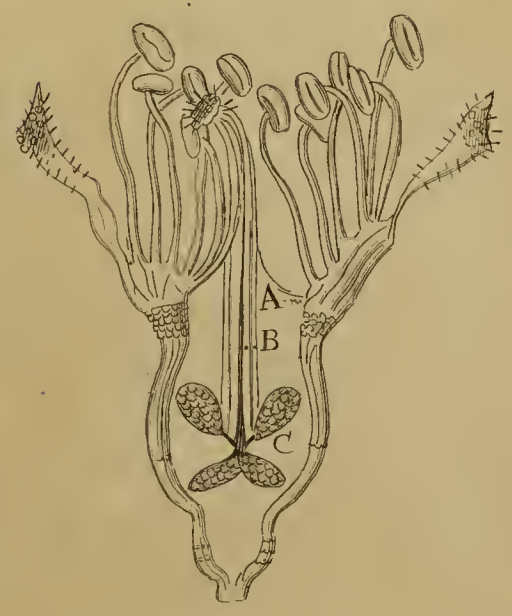

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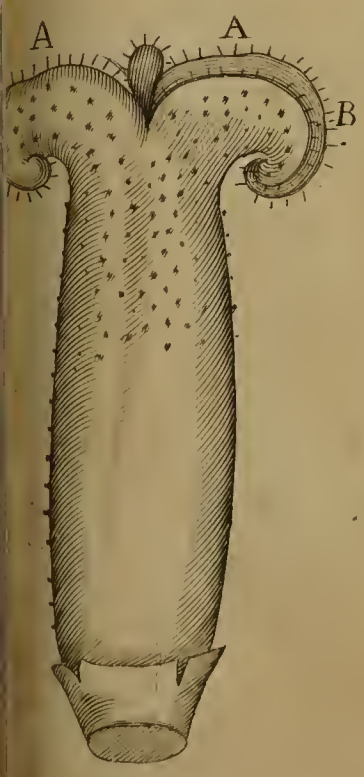

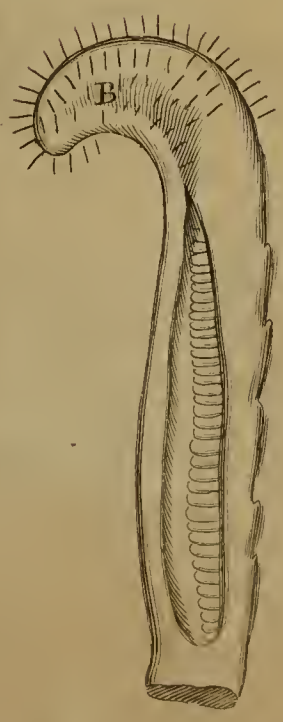

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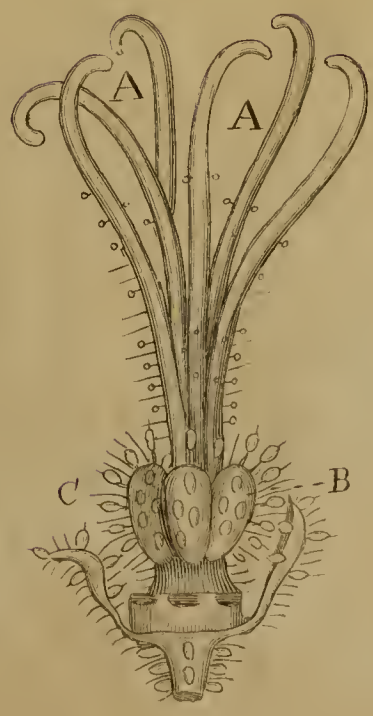
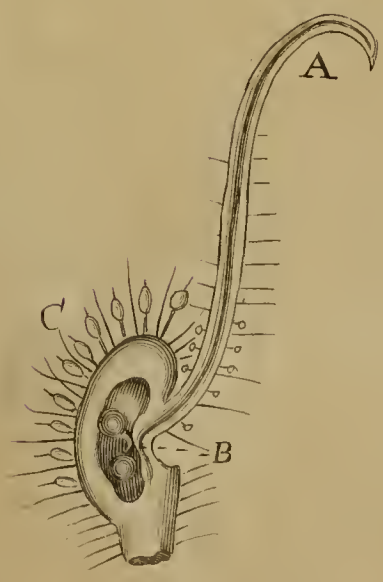




etenim 200, ab umbilico calycis *A*, turget uterus prælongâ tubâ *B*, quæ capitulo *C*, fiſtulis conſperſo, donatur; venter autem ſemen *D* continet. In *gladiolo* 201, tenellum adhuc uteri corpus *A* ſemina *B* fovet; ingenti eminet tubâ, quæ in tres hiantes appendices *C* aperitur, fiſtulis conſperſas. In *tithymallo*, *chamæciſto* 202, à floris centro *A*, longus producitur ſtylus, qui ſeminum loculos *B* promit; ab hoc uterinæ tubæ *C* hiantes emergunt, piliſq; cooperiuntur. Segetum quoq; plerumq; uterus mirabilis eſt; in *tritico* & *meliſſâ* 203, ſubrotundum turget uteri corpus *A*, geminas tubas *B* promens, à quibus hinc inde pili erumpunt. Solet ulteriùs natura in uno eodemq; flore uteros multiplicare; uti miramur in *lino*, & *aquilegiâ* 204, quæ quinque vel ſex diſparatis uteris *A* pollet; hi oblongam poſſident tubam *B*, fiſtulis & pilis conſperſam. In *rubo canino*, & *roſis* 205, largiori ubertate uteros natura multiplicat: Nam calycis concavitas *A*, uterorum *B* congerie repletur; à lateribus enim calycis enaſcuntur ſtyli *C* multiplices, qui proceriori tubâ *D* elongati in hiatum tandem *E* fiſtulis refertum deſinunt. In *piro*, & *malo cydonia* 206 eadem uterorum multitudo luxuriat. A craſſiori calyce *A* concavitas relinquitur, quæ ab erumpentibus uteris *B* occupatur. Quilibet horum ſtylus plura alit ſemina *C*, & ingenti coronatur capitulo *D*, multo capillitio ditato. In floribus, quos copioſi excitant floſculi, plures pariter turgent uteri, ut in *belli*, *ciano*, & *cichorio* 207 patet. Hujus ſinguli uteri *A*, aſſurgente tubâ *B*, condecorantur, quæ ſtaminum capſulâ *C* cuſtoditur, & floris folium *D* cæruleum & concavum adſtat. In *fragaria* 208, & conſimilibus, multiplicantur uteri *A*, & à piniformi corpore *B* emergentes, aeri exponuntur. Quilibet uterus tubâ *C* conſtat, & fibroſâ appendice *D*, pericarpio *B* nectitur. Hoc idem evidentiùs conſpicimus in *Veneris labro*, & ſimilibus 209. Pineale hujus corpus ab extremo cauliculi aſſurgit, à quo hinc inde copioſi floſculi *A*, quaſi tot uteri, erumpunt. Quilibet floſculus calyce cuſtoditur, lato ſcilicet, & concavo folio *B*; quod in ſtyliformem appendicem *C* deſinit, & ſpinis *D* armatur. Floſculus in ſui baſe uterum *E* cum contento ſemine cuſtodit, aſſurgente tubuloſo folio *F*; & emergentibus pariter ſtaminibus *G*. Corpus, cui floſculi hærent, licèt intus condatur, eſt tamen loco pericarpii; fibroſis itaq; productionibus *H* ambitur, à quibus fiſtulæ ligneæ, & tracheæ *I*, in ſingulos floſculos derivantur. Coercita medulla, vel pericarpium *K*, utriculorum ordinibus, reticulariter implicitis, coagmentatur; hi in cauliculo ſenſim in ſolitos medullæ utriculos *L* coercentur. TAB. 33. TAB. 34.

Uterorum tàm varia hucuſq; expoſita forma hiantes exhibuit tubas, ut facilè pateat, ab uteri ventre perpetuò hiatus per tubam aperiri; manifeſtiora autem redduntur hæc in *Narciſſo*, & *lilio* 210; diverſi enim loculi *A*, & quaſi ſiliquæ, in communem hiatum *B* deſinentes, per rimulas *C*, fiſtulis conſperſas, perſpirant. Idem evidentiùs in *malo Punicâ* apparet; nam in ſecto per medium flore 211, tubæ quidem multiplices aſſurgunt *A*, & inter ipſas ductus *B* aperitur, in quem peculiaria ſpiracula à ſeminum cellulis *C* deſinunt.

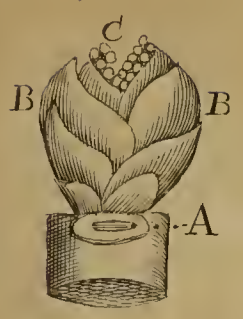
Vidimus

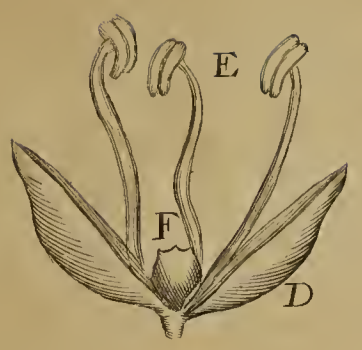
Vidimus ulteriùs in tubæ hiatu molles fiſtulas, pilos æmulantes, utplurimùm ſubluteas, terebinthinamq; fundentes, luxuriare. Hæ præ cæteris patent in *tulipæ* ſtylo 212; cujus licèt breves ſint tubæ *A*, ingenti tamen hiatu *B* aperiuntur, oriſq; interiorem partem tenellę occupant fiſtulæ, ſeu capillamenta, glutinoſum fundentia humorem. In *dictamno albo* 213, ſex efferuntur tubę *A*, totidem uteris *B* exortę, quorum quiſq; plura alit ſemina. Exterior uteri portio inſignibus utriculis, & capſulis *C*, terebinthinâ refertis; cooperitur, pili pariter interſeruntur.

Fœcundos flores hucuſq; ſcrutati ſumus: Naturę tamen mos eſt, velut animalibus quibuſdam accidit, ſubventaneos & infœcundos edere. Et ſicut in exaratis floribus, partes in gratiam incluſi uteri (fœcundi tamen) circumlocantur, ita in quibuſdam herbis, & arboribus, juſſo divortio, florem longè ab utero non ſolum pendere voluit natura, quaſi ſubventaneum ovum, cùm nullum relinquat poſt ſe ſemen; ſed ulteriùs diſtinctâ plantarum ſpecie, quaſdam infœcundas reddidit, his tantum contentas floribus, reliquas verò utero ditavit. In *mori* pluribus individuis
TAB. 35. 214 flores omnes amentacei ſunt, ipſorumq; productionem longè anticipat natura, & per hyemem foliolis gemmę cuſtodiuntur; â ſitu etenim delapſi folii *A* quaſi gemma eminet, pluribus contexta foliis *B*, quâ oblongus florum racemus *C* cuſtoditur. Unuſquiſq; autem floſculus hians quatuor componitur foliolis *D*, viridibus, & concavis; tria pariter ſtamina *E* aſſurgunt, & à floris centro loculus *F* attollitur, veſiculam *G* intus cuſtodiens; hæc aqueo turget humore, qui tandem evaneſcit. In reliquis verò individuis, quę vulgariter maſculæ 215 appellantur, fit conſimilis racemus, ſeu tot uterorum conglobatio; ſinguli verò uteri exteriùs quatuor foliolis concavis *A* circumambiuntur, quorum unguis pilis ornatur. Uterus *B* geminis contortis tubis *C* pollet; intus intra ſecundinas ſub oſſeo nucleo ſemen fovetur. Idem miramur in *urticæ* diverſis vegetantibus, quorum amentacei flores 216 quatuor contexti ſunt foliis *A*, totidemq; ſtaminibus *B*, & loco ſtyli veſicula *C*, ſeu calyx, terebinthinâ referta additur. In fœcundis autem urticis à nodis pendent quaſi ſtylorum racemi. Omnis uterus *D* turgido corpore aſſurgit, & à ſummitate, tubarum loco, diaphana emittit capillamenta *E*, quę quaſi nodis *F* articulari videntur; intus ſemen *G* ſecundinâ velatur; quatuor folia *H*, conſperſa pilis, adſtant. In aliis verò plantis amentum, & ſtylum, loco tamen diſparatos, locavit. Hoc miramur paſſim in *tritico Indico*, à cujus extremo caule eminet muſcarium, qua juba 217; ramorum enim inſtar producuntur ſurculi, alios minores proferentes, à quibus pediculi promuntur: Ab his itaq; pendent amentacei flores, qui ſolitis calycis foliis *A* cuſtodiuntur; interiùs alia locantur foliola *B* gracilia, feréq; diaphana, florem intimè ambientia. Ab *umbilico* tria eminent ſtaminum capita *C*, brevibus firmata pediculis. In medio, loco ſtyli nil obſervatur; circa ſtaminum exortum foliola ſubalba, molliaq; *D*, hæcq; gemina, florem integrantia, adſtant. A ſingulis nodis, & præcipuè ſuperioribus erumpit

panicula,

214.





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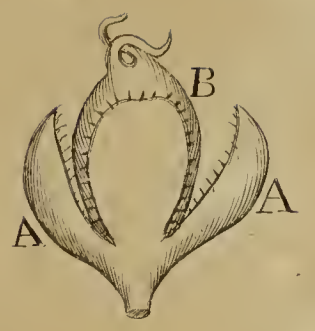

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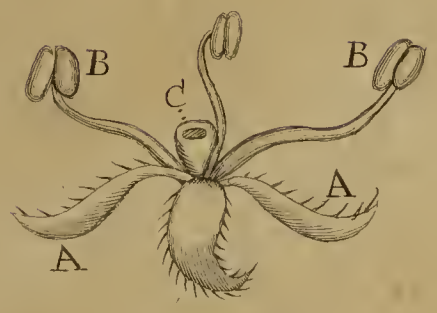

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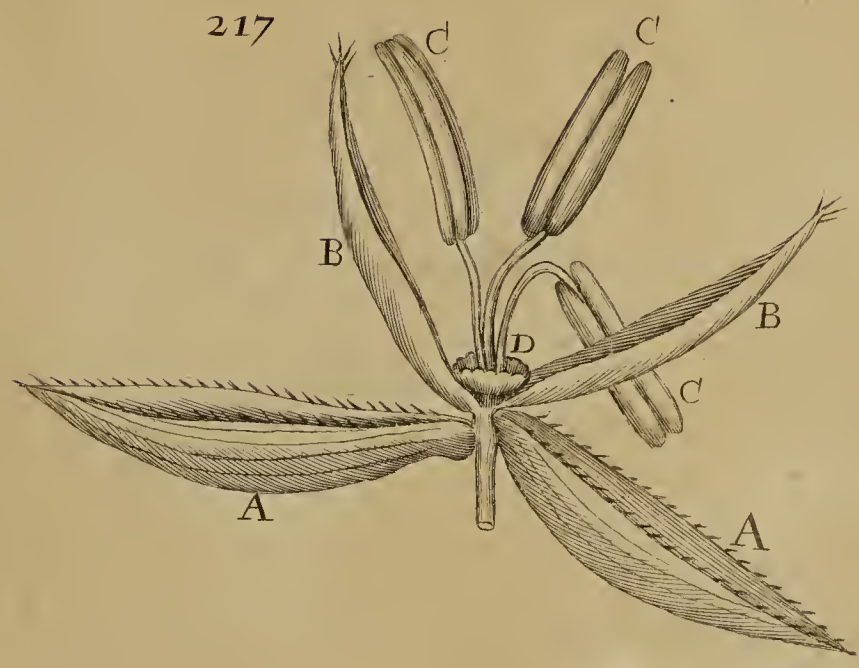

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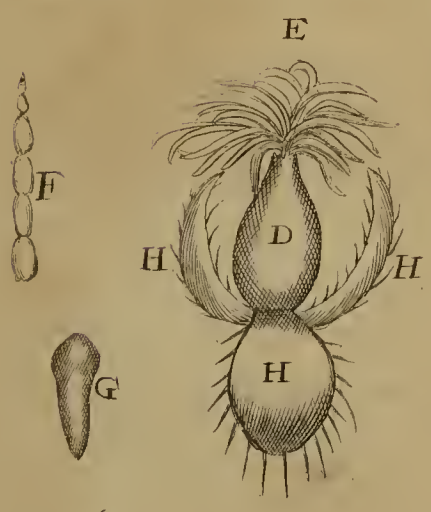

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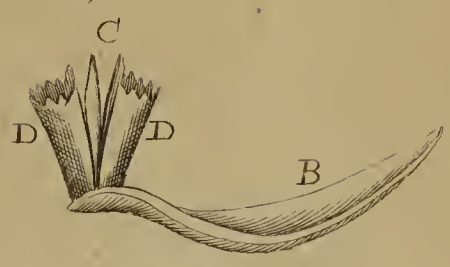

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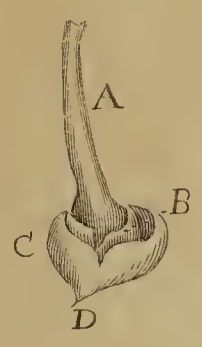

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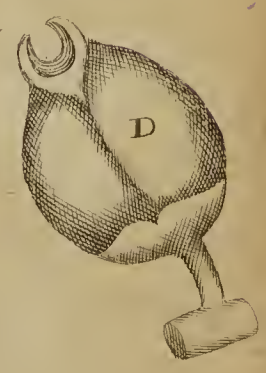

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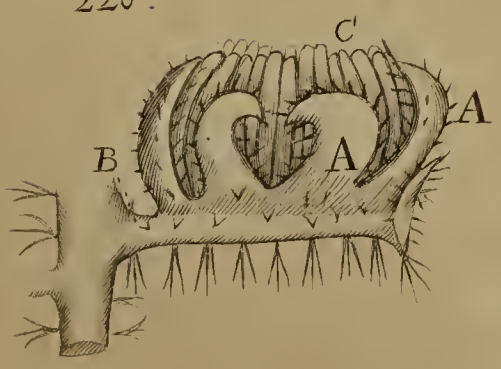

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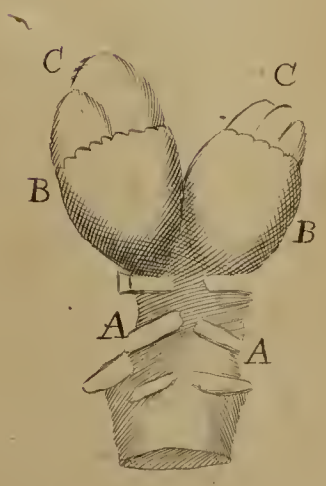

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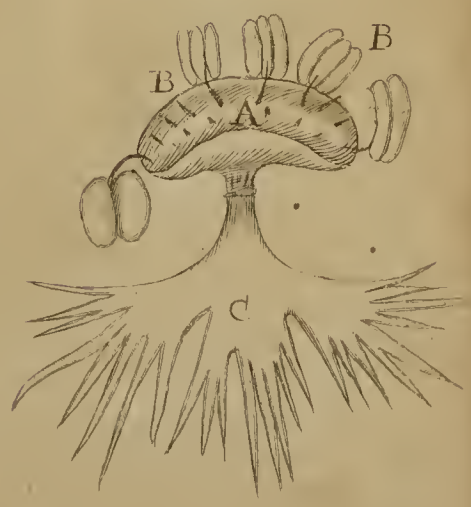

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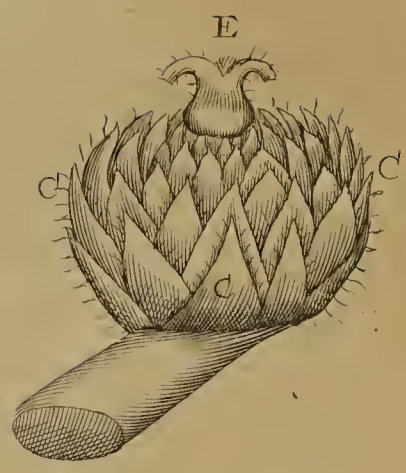

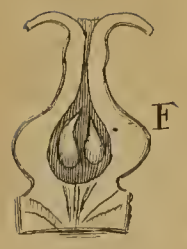

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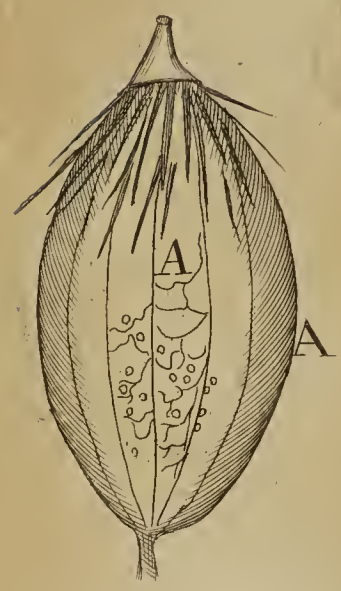

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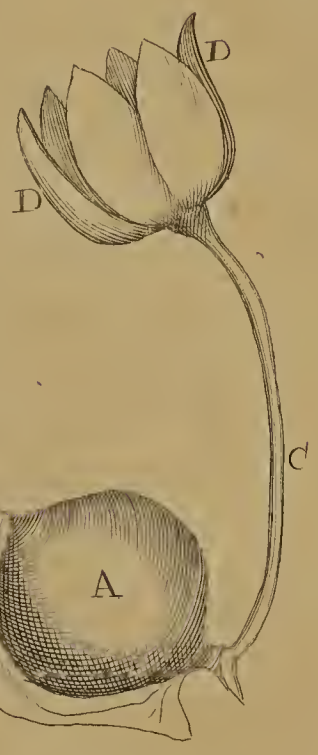

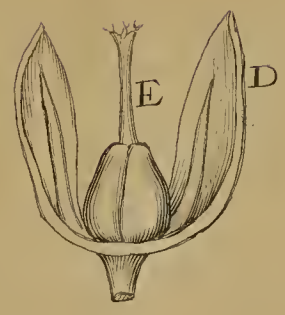

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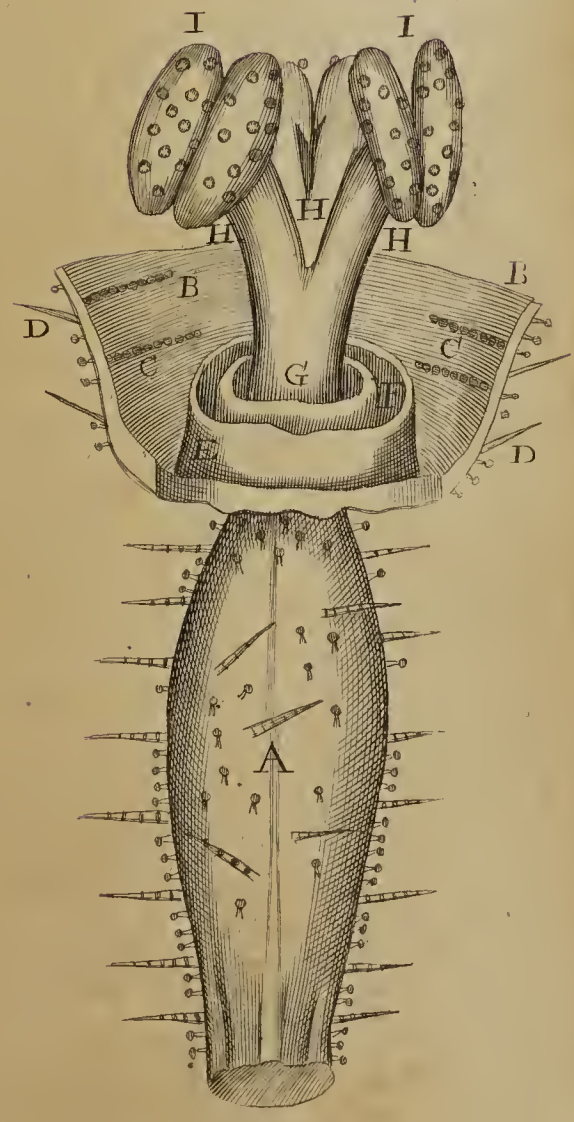

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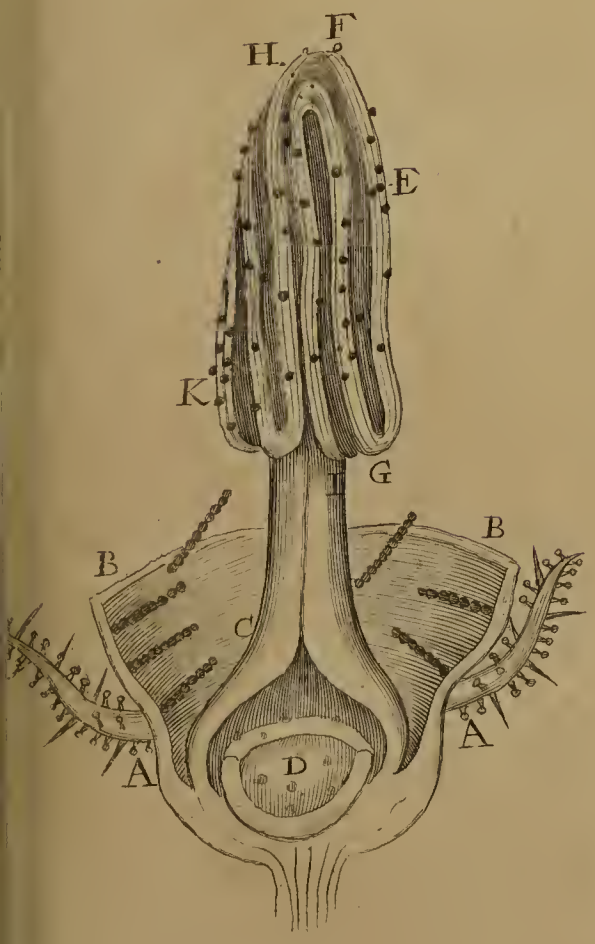

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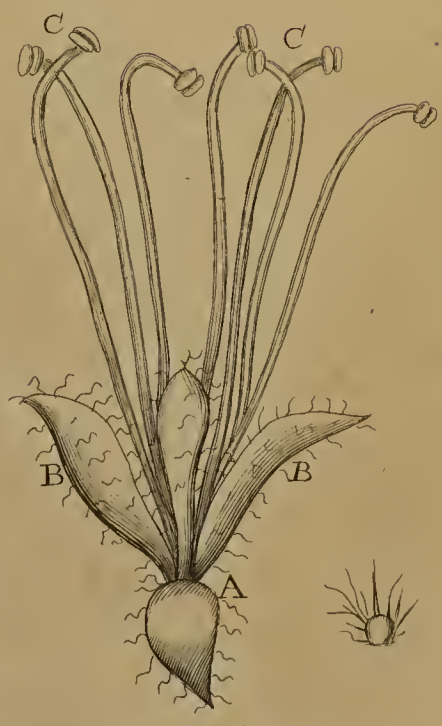


panicula, congeries ſcilicet fœcundorum uterorum, ſub foliis à ſitu gemmarum pyramidalis aſſurgit vagina, parum diſſimilis ab exarata in *ſalice*; ſub hac foliola minora locantur, quibus uteri involvuntur. Extracta igitur tenella & minima panicula 218, conglobatos exhibet uteros, & ſinguli baſim præcipue paniculę tenentes, hac pollent formâ: Ab umbilico tenella tuba *A* eminet, cui foliola mucoſa *B* adſtant, quę à grandioribus *C* ambiuntur; ſingula à dilatato petiolo *D* pendent.

In arborum quoq; genere idem accidit. In *populo* 219, oblongus quaſi racemus, tot floſculis contextus, pendet; floſculi hujuſmodi amentacei unico hocq; concavo excitantur folio *A*; ab hujus centro quinq; ſtamina *B* erumpunt, ſolito decorata capitulo, quo hiante, lutei globuli effunduntur. Inferius calycis loco laciniatum pendet folium *C*. Ab eadem planta, diverſo tamen ſitu, erumpit ſtylus, ſeu uterorum congeries, velut uvæ racemus; quiſq; autem botrus *D* inter pilos ſemen cuſtodit. In *nuce* 220, pariter amentum copioſum obſervatur, floſculis excitatum, ita ut oblongus conſurgat racemus. In unoquoq; floſculo folia numero ſex, craſſa & virida *A*, è petiolo *B* exorta, occurrunt, quibus ſtaminum congeries *C* continetur. Singula cinereis pilis, in atrum deſinentibus, ferè cooperiuntur. Ab eodem autem ramo 221, & ſurculi apice, gemmę inſtar, ſtylus prominet, qui tandem in fructum evadit. Ab extremo igitur ſurculo *A*, qui gemmę inſtar foliola promit, ovalia emergunt corpora *B*, fungis & papillis conſperſa, diverſa foliola *C*, tubarum loco, promentia; in centro autem *D* ſemen gignitur. In *quercu* 222 quoq; amentum pendet, multiplici flore congeſtum, quod foliolis & ſtaminibus abſq; ſtylo, de more, conſtat: Longè autem turget uterus à ſurculo *A*, pendens, & calyce *B*, angularibus foliis excitato, cuſtoditur; brevi tamen plures manifeſtantur foliorum ordines *C*, à craſſo concavoq; corpore erumpentes. Superiùs uterus *D* tribus eminet tubis *E*; ventre autem ſeminum inchoamenta *F* fovent. In *carpino* 223, ultra amentum ſtylus occurrit, multis veſiculis conglobatus. Quarum unaquæq; tenui conſtat pelliculâ *A*, quę ligneis fiſtulis, & tracheis reticulariter implicitis, irrigatur, quibus utriculi appenduntur. Laceratâ veſiculâ pecularis ſeſe offert uterus *B*, geminis aſſurgens tubis *C*, in cujus centro ſemina *D* aluntur. In *alliis*, & *moly montano* 224, frequenter, licèt ſtylus extra florem erumpat, ipſius tamen petiolo hæret. Ab extremo cauliculi, ſoboles plures, globuli ſcil. *A*, pendent, tenui convolutâ membranâ *B*, quibus ſemen tutatur. A ſingulo pediculo *C* attollitur flos, ſex condecoratus foliolis *D*; ab hujus centro quandoq; eminet quaſi ſtylus *E* cum appendicibus, & hinc inde ſtamina adſtant. Flos hujuſmodi ſtylo etiam donatus, utplurimùm, & ferè ſemper, nullo ſubcreſcente ſemine, amentaceus redditur, & contabeſcit. TAB. 36.

Conſuevit pariter natura, copioſę intenta ſeminum productioni, *fœcundis* floribus in eodem caule vel ſurculo *amentaceos* interponere. Hoc paſſim in *cucurbita* 225 miramur, à cujus unico caule diverſi pendent flores: Alii namq; fœcundi ſunt, quorum fructus ſeu uterus *A* infra floris baſim primo turget, & tandem flos ſuis inſtructus ſtaminibus & foliis aperitur. A

calyce etenim tubulosum amplumq; floris folium *B*, interiùs luteum, exteriùs parum virescens, assurgit, quod ultra medietatem, mediis incisuris, in quinq; solvitur acuminata folia; interiùs eminent pili *C*, globulis invicem hiantibus compositi; exteriùs spinę *D*, internodiis compaginatę, prominent. Ab umbilico floris assurgunt geminę appendices, quasi crassa folia, lutei coloris, quorum amplius *E*, arctius *F* continet: Ab horum centro staminum pediculus *G* eminet, qui in tres subdividitur *H*; horum singuli geminantur, & capitulis *I* condecorantur. Amentacei ejusdem *cucurbitæ* flores à fœcundo pariter caule erumpunt, quocumq; situ; hujusmodi nullum fructûs seminumq; vestigium exhibent, sed ipsorum oblongus pediculus in calycem *A* 226, laxatus, floris folia *B*, non dissimilia ab exaratis, promit; à medio umbilico staminum petiolus latâ basi *C* excrescit; hæc interiùs concava, & frequenter rimulis hians, concham *D* lutei coloris, humorum copiosè effundentem cooperit. Petiolus hujusmodi videtur qnasi plurimum pediculorum congeries; loco capituli, staminum elegantia conditoria suspenduntur: Oblongę etenim, siliquarum instar, capsulę *E* à superioribus *F* ortę, ad inferiora *G* deducuntur, & iterum sursum *H* reflexę, tandem inferiùs *I* prolapsę terminantur. Geminis itaq; capsulis parallelis, invicem unitis, singula exarata circumvolutio constat, hisq; diductis globuli *K* effunduntur. Pluribus elongatis capsulis constat stamineum hoc capitulum. Parum dissimili methodo in *castanea* 227 incedit natura; nam plures pendent à tello surculo oblongi florum racemi; hinc inde autem appensi flosculi ultra calycem *A* subluteis foliis *B* constant: Ab horum centro oblongi ascendunt staminum petioli, luteo ditati capitulo *C*. In extremo surculi ejusdem apice, una, vel altera
TAB. 37. pendet florum congeries 228, quasi racemus; in his flosculi, qui poximiores sunt petioli implantationi, seu mavis, fibroso fasciculo, à quo singuli pendent flosculi, fœcundos uteros æmulantur; suntque frequenter gemini. Hi subluteis foliolis *A* componuntur, quę pilis parum viridibus cooperiuntur; emergunt autem à subrotundo corpore *B*, quod tractu temporis, uteri instar, semen fovet: Ablatis floris filiolis *A*, stamina *C* patent, suis firmata capitulis, quę brevibus appenduntur pediculis; cujus contrarium in amentaceis floribus miramur, in quibus oblonga luxuriant stamina. A floris umbilico assurgunt plures styliformes processus rotundi *D*, inęqualis magnitudinis, qui *tubarum uteri* vices fortasse supplent. Flosculi hujusmodi, seu uteri, à communi exoriuntur basi *E*, & tres assurgunt unico concluśi calyce, in quibus semina adolescuut. In *pino* 229 uterorum congeries, seu multiplices styli observantur; hi biennio antè erumpunt, floris specie, & invicem conglomerati ovale excitant corpus, cujus exteriora foliola *A*, squamarum instar, sese invicem cooperiunt. Sectus hujusmodi stylus, ab extremo surculo *B* emergens, in foliola *C* laciniatur. Hinc inde peculiares uteri eminent, qui folio *D* constant, styloq; seu tubâ *E*, semina custodiente. Ad implantationem singulorum, ligneæ fibræ derivantur, à ligneo cylindro *F* productæ. Extractus igitur quicunq; uterus *E* tenellus est, &, quasi calyce, folio *D* tutatur,

tatur; adhuc mollis eſt, & inferiùs geminam protuberantiam *G* in baſi habet, quâ contenta ſemina cuſtodiuntur. Tractu temporis decidente calyce *D*, augetur uterus, & tandem fit oſſeus. In *cupreſſo* 230 flos amentaceus pendet veluti in *populo* &c. Loco autem ſtyli, coni ſeu nuces excitantur, quæ tenellæ in ſuarum partium interſtitiis peculiares, quaſi ſeminum *A* loculos, velut uteros, cum brevi tuba *B*, foras emergente, continent.

Flores, multiplici partium apparatum conſtantes, jam indagine percurrimus; horum nonnullos natura fœcundos, ſcilicet calyce, foliis, ſtaminibus, & ſtylo donavit; reliquos verò ſtylo orbavit. Laxatur itaq; cauliculi extremitas, vel ſurculi corpus, in florum compagem, & exterior corticis ſubſtantia vel in calycem extenditur, vel in ejuſdem folia laciniatur; unde variæ ipſius ſpecies, & magnitudines conſurgunt, prout magis & minus contentus ſtylus fovendus eſt; qui verò plurium floſculorum compage excitantur, frequenter multiplicibus calycis foliolis tutantur; ſicut & reliqui pariter, quorum tenella ſubſtantia operimento eget. Interioris cauliculi, ſeu ligni, ſubſtantia, fiſtulæ ſcilicet & tracheæ, extenduntur & elongantur in floris folia, quæ omni vaſorum genere inſtructa pendentibus utriculorum ſeriebus excitantur: Hæc teuni halituoſoq; turgent ſucco, unde inciſuras non patiuntur; ob humoris etenim benignitatem & ductilitatem, utriculorum ordines extenduntur uſq; ad extremum unguem; & ut plurimum vaſa non ab una excidunt coſtula, ſed copioſi faſciculi à baſi aſſurgunt, & productis ramis in omnem dimenſionem elongantur. Non longè à foliis ſtamina à lignea portione attolluntur, peculiarem ſuccum in propriis loculis cribrantia & ſervantia; hunc patenti, ut vidimus, hiatu, datâ viâ, ſub globulorum forma effundunt, & diſpergunt. In horum medio ſtylus fovetur, cujus concavitate colliquamenti veſicula, vel ſeminis inchoamentum conditur, & in ipſo augetur; unde plantarum uterum eſſe autumo. Nec ſtructura reclamat; nam, ſicut in *oviparis* unica eſt concameratio in ſolam tubam deſinens; in *viviparis* verò ut plurimùm uterus geminis ovariis totidemq; tubis compaginatur; ita in floribus uterus, ſeu ovarium unicum quandoq; eſt, cujus tuba hiatu patet, quandoq; multiplex eſt, totidemq; exporriguntur tubæ. Harum extrema pilis ſeu minimis ſyphonibus ornantur, à quibus terebinthinæ inſtar glutinoſus effluit ſuccus, non tantum, ut reliquum alimenti depuretur, ſed, ne inſecta intus irruant, ſuo glutine obſtat. Patet etiam aditus, ut externo ſubintrante aere copioſior contingat tranſpiratio. Vegetantium igitur uteri gratiâ, reliquæ floris partes, folia ſcilicet, ſtamina, & calyx circumlocantur in fœcundis floribus, in amentaceis autem ab eodem erumpentes ſurculo non longè ab utero diſtant.

Interdum dubitavi, an florum folia in ſuis utriculis ſuccum excoquant, quem intro refluentem tenello utero, & ſeminis inchoamento affundant, ſicut de reliquis ſurculorum foliis probabiliter deduxi. Quandoq; ſatiùs credidi, foliorum miniſterium in incongrui humoris depuratione verſari; plura enim ſeminalium particularum præcipitationem remorari & im-

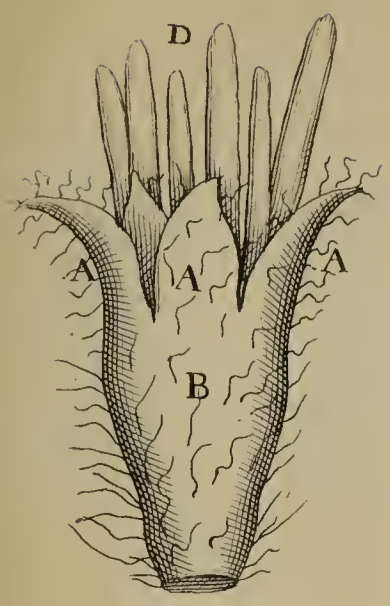
impe-

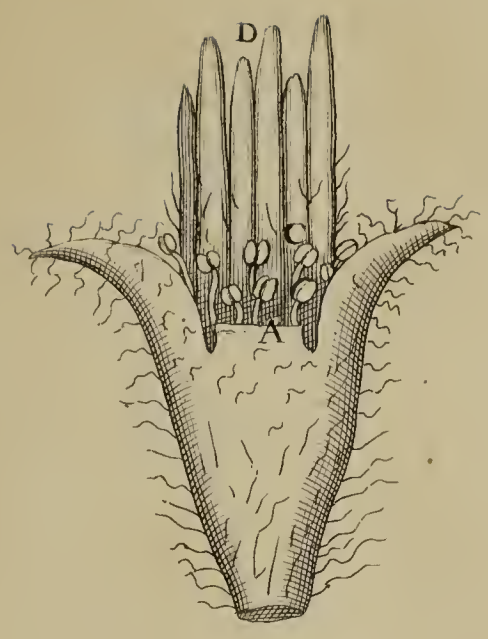
pedire poſſunt: Et licèt in amentaceis ſtamina & folia immediatè uterum non ambiant, ſed aliquantiſper diſtent; ſurculi tamen contentus humor purior reddi poteſt amenti eruptione, ut expeditior & defæcatior in uterum irruat. Huic pariter muneri ſubſerviunt, ultra ſtamina, fungi, & papillares utriculi, ſeu capſulæ terebinthinam effundentes; unde fas eſt dubitare, naturam plurimum humoris, huncq; diverſæ ſubſtantiæ, ſeminum generationi incongruum, per hæc quaſi emunctoria eliminare. Hinc fortaſſe non incongruè derivato nomine *menſtruæ purgationes*, quæ in mulieribus conceptionis tempora proximè antecedunt, veluti florum eruptiones ſuccedunt; & ſicut determinata ſucci portio per ſtamina & floris folia excernitur; ita in viviparis, quæ conceptûs particulas quoquo modo inficere poſſunt, ſingulo menſe cribratæ per uterum foras protuduntur, ut reliquum defæcati ſanguinis, in utero ſtagnantis, faciliùs vi ſeminis fœcundetur, & in animalis naturam dirigatur. Et quoniam in menſtruorum eruptione maturitas quædam temporis requiritur, ut prorumpant, ritéq; celebrentur, & his ſuppreſſis generatio tollitur, & vitiatur; Ita florum pariter productio in plantis non illicò ſuccedit, ſed poſt determinatum tempus; nec perpetuò fœcunda ſunt ſemina: Hoc patet in *tulipis*, *pomis* & ſimilibus; in illis enim annotinæ florem non edunt, & ſucci cruditas in floris folia derivati, ſeminis perfectionem adimit, ita ut productæ ſobolis fœcunditas foliorum maturitate ſufficienter indicetur. Cruditatis ſigna in *tulipæ* foliis patent, & virore manifeſtantur, reliquis autem ſaturatioribus coloribus coctio indicatur: Hanc verò nullo naturæ fine peragi probabile eſt, ſed ſola materiæ & circumambientium neceſſitate; aliàs maturitas cum interitu coincideret.

Floris folia, tenello utero cuſtodiæ gratiâ elargita, ſi plus juſto luxurient, multiplicatis exortibus & planis, (ut in plenis floribus obſervavimus,) vel ſemina manca redduntur, vel deficiunt, & nullus plerumq; uterus adeſt; unde probabiliter dubitare poſſumus, an ſinguli fiſtularum faſciculi in folia elongentur, & abſumantur, nullæq; ligneæ fibræ, uteri ſtructuræ, & colliquamenti veſiculæ relinquantur, & ita infœcundi contingant flores. Sæpiùs avulſis floris foliis, antequam hiarent, in *tulipa* præcipuè, expectavi, an ſtylus, ſeu denudatus & depauperatus uterus, incrementa caperet; & interdum ejuſdem incrementum remorari obſervavi, quandoq; quædam ſemina abſq; noxa debitam ſortita ſunt magnitudinem; unde adhuc dubius ſum, an floris folia à Solis & externi aeris irruentibus conatibus tenellum uterum tutentur, an ulteriùs etiam depurando, præparent auctivam ſeminis materiam.

De

228.





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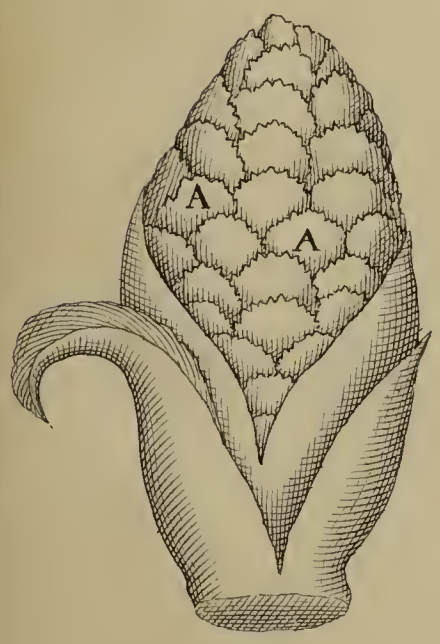

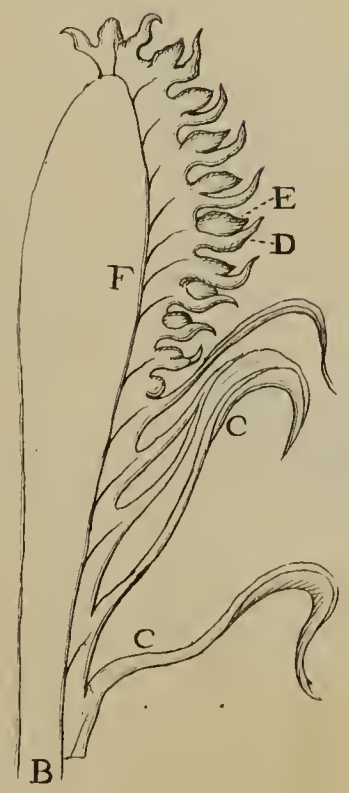

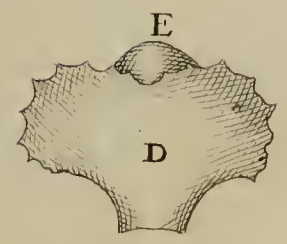

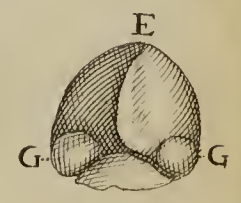

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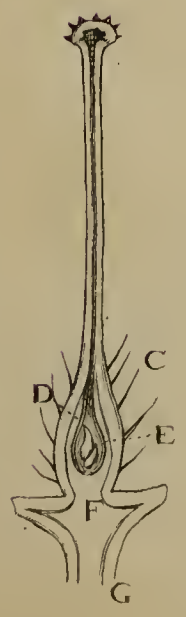

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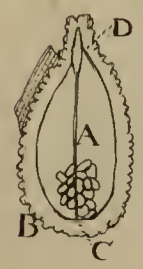

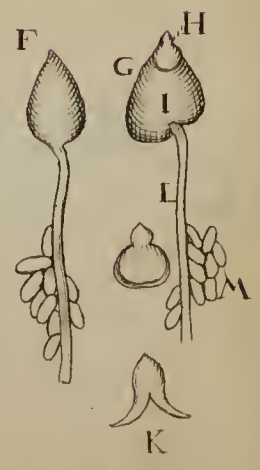

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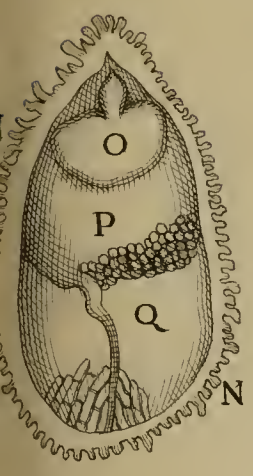

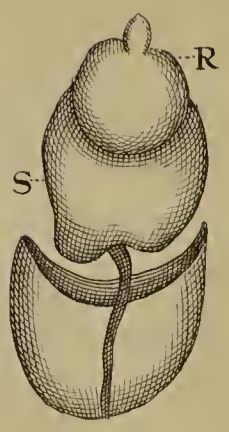

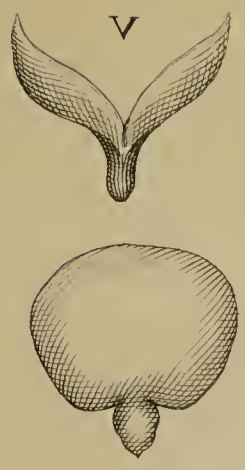

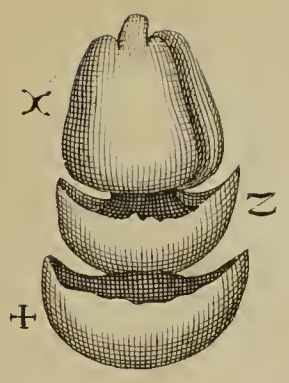

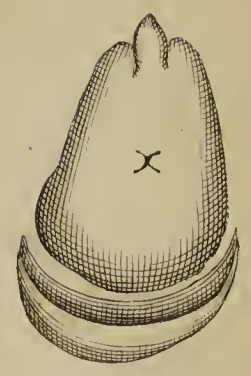

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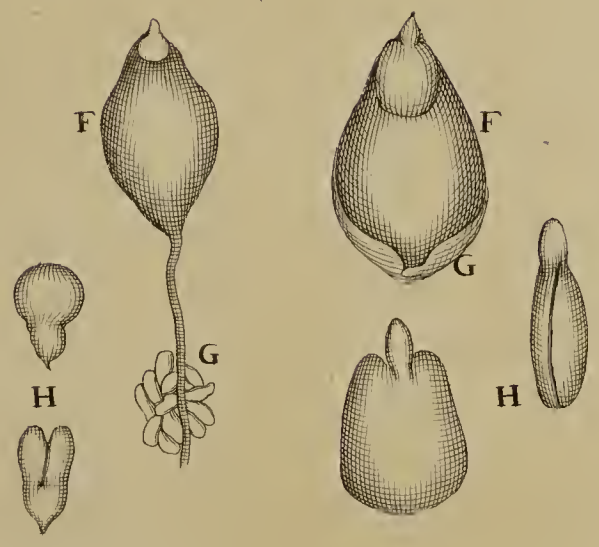

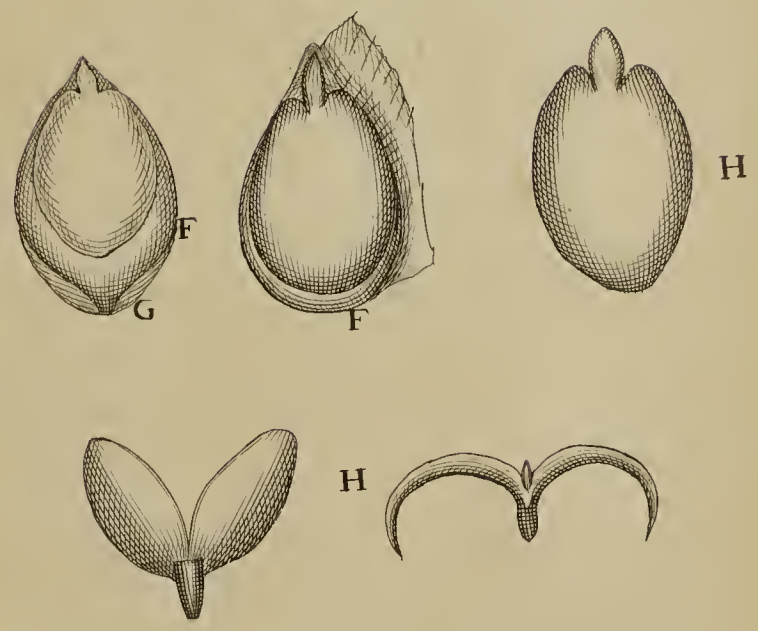

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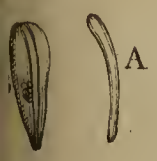
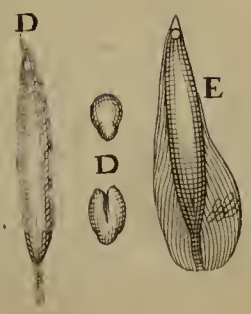
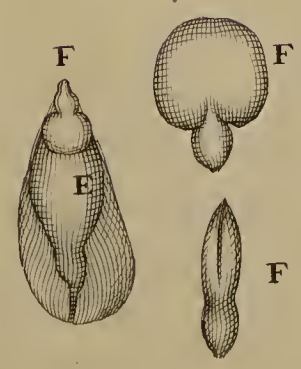
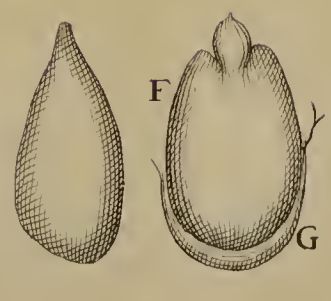
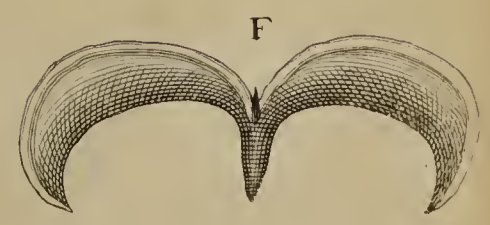










De Seminum Generatione.

TEnellus uterus hucuſq; expoſitus *ſeminis* productionem promovet; ſuoq; ſinu alit & fovet, donec concreditum ſolo, in novam plantam adoleſcat. Succeſſivas igitur mutationes & productiones non valde diſſimiles à generatione fœtûs in utero exarare tentabo. In *ceraſo*, *pomo*, *malo Perſica*, *pino* & *amygdalo*, decidentibus florum ſtaminibus & foliis, ſenſim tumeſcere incipit uterus, ſeu ſtylus, adaucto intus colliquamento. Ita patet præcipuè in *amygdalo* 231, cujus uterus *A*, ad ovalem accedens for- TAB. 37.
mam, tubâ *B* conſtat, quæ tota perforata eſt, & in apice capitulo ſeu hiante infundibulo coronatur, quod capillamentis ſubluteis, terebinthinam fundentibus, ornatur. *Tuba* hæc, quò magis uterus augetur, tantò minor apparet; ita ut ex toto contabeſcat: Exteriùs pilis & aculeis *C* contegitur: Intus cavitas *D* adeſt, quæ geminas utplurimum veſiculas *E* continet, in quarum centro colliquamenti ſacculus cuſtoditur. Uteri ambiens ſubſtantia fibras & tracheas *F* à pediculo *G* recipit, & ſenſim excreſcens in oſſeum neucleum & pericarpium augetur; paucis elabentibus diebus in auctiori utero grandior veſicula ſeu *ſecundina* 232 occurrit *A*; hæc exteriùs fibrarum lignearum reticulari plexu ornatur, qui ab ambiente cortice in appendice *B* derivatur: Hac avulſa, conſimilis ſacculus *C* emergit, qui utriculis *D*, ſemiconcreto ſucco turgidis, vitrei coloris, repletur. Paulò poſt hujuſmodi ſacculorum centrum, per longum excurrens, occupat rectum quoddam vaſculum *E*, quod *umbilicale* appellare licebit. Paulatim in dies obliteratâ tubâ, & craſſiori ſupercreſcente pericarpio, ſimulq; oſſeo nucleo emergente, ſecundinæ & conceptûs moles augentur 233, tuncq; *umbilicus A*, cum exteriori ſecundina *B* continuatus, in ſitu *C*, & in apice laxatus, veſiculam colliquamenti, vel ſatiùs *amnii D* continet, quæ ſubſequentibus diebus auctior reddita, ſucceſſivas haſce ſubit formas *E*, *F*, *G*. Poſtremò fœtus *H* manifeſtatur, amnii *I* ſummitatem tenens, ejuſq; color candidus, ſubſtantiâ mucoſâ, geminis quaſi alis *K* conſtans, & umbilicus *L* per medium utriculorum *M*, *chorium* referentium, producitur. Tranſactis aliquot diebus, *exterior ſecundina N*, TAB. 38.
cæcalibus excitata utriculis, humore turgida, fœtum ambit, & ſecta per longum exhibet ſemen *O*, ſummitatem amnii *P* occupans, à quo tortuoſus erumpens umbilicus, chorion *Q* excurrit. Fœtus hic brevi etiam grandior redditur; adaucta enim ſeminis *R* mole, amnion *S* magis turget, exinanito chorii ſucco, vigente adhuc umbilico. Avulſus fœtus taliter configuratur; nam hiantibus alis *V* amnii ſummitatem amplexatur, nulla intercedente concavitate. Amnii moles variâ conſtat formâ, & immergitur in concava chorii ſummitate ſemilunari: In amnio pariter utriculi occurrunt, peculiarem ſuccum continentes, vitreum oculi humorem referentem, qui majori pollet ſoliditate ac in chorio deprehendatur. Auctius redditum ſemen *X*, ferè abſumit amnii *Z*, choriiq; ✠

ſuccum. Illud enim acuminatâ quaſi lingulâ fœtus hiatum penetrat ſolâ intercedente contiguitate; inter amnion verò & chorion membranæ mucoſæ mediant, quæ interdum vaſorum ſpecie imponunt. Poſtremò, completo fœtu *X*, in fundo reliquus humor cum corrugatis tunicis ſupereſt. In *pomo* 234, pariter ſeminis productio parum diſpari incedit progreſſu; *umbilicus* enim *A*, per longum excurrens, ſenſim in apice dilatatur, in quo plantula *B* primò emergit; amplius redditur amnion *C*, & chorii ambientes utriculos *D* umbilicali vaſe excurrit. Plantulæ ſeu ſeminis ſpecies eſt *E*: Succeſſivis augmentis amnii moles *F* turgidior redditur, contabeſcente chorio *G*; ſemen verò *H* quotidiana auctione chorii, amniiq; inſumendo humores, varias ſubit formas. *Piri* 235 quoq; ſemina, emergente umbilico *A*, intra ſecundinas *B*, colliquamento turgidas, conſimili incremento producuntur. Senſim extenditur umbilicus *C*, & tandem ſeminalis plantula *D* apparet; hæc, turgente indies amnio *E*, auctior plantula *F* redditur, ita ut tandem utriculorum tunicæ in exiguam molem *G* complicitæ ſuperſint. Conſimilem ſeminis generationem mirari licet in productione *ceraſorum, prunorum, & promorum Armeniacorum* 236, quorum variæ ſpecies ſunt ab *A* uſq; ad *B*.

Quid ſimile in plantis quibuſdam, & præcipuè in *cucurbita* occurrit,
TAB. 39. 237; in cujus ſecundinis *A*, liquore ſcatentibus, tubuloſum valdeq; latum producitur *umbilicale vas B*, colliquamento turgidum: Hujus extremitas temporis diuturnitate amplior reddita, chorion exhibet, quod varias formas *C, D*, induit; tandem ſemen, ſeu primæva plantula, ab apice amnii *E* aſſurgit, cujus forma *F*; & plerumq; gemina hiant folia. Succeſſivo incremento turgidius amnion *G*, utriculis conglomeratum, plantulam ſeminalem *H* fovet, cujus varia forma eſt *I*. Poſtremò depaſcente plantâ *K* ambientem amnii *L* humorem, chorii *M* moles ferè obliteratur. Variè licèt configuretur amnion, non rarò tamen ſpecies hæc *N* cum elongato umbilico *O* occurrit.

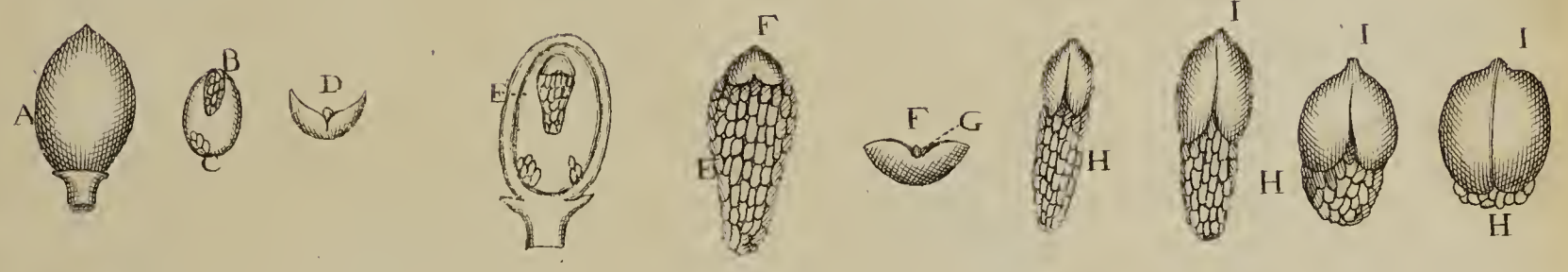
In *lauro* iidem occurrunt humores concreti, nullo tamen intercedente umbilico 238. Tenellus primò eminet ſtylus *A*, quo aperto, amnion *B* patet, utriculis conſtans, quod in chorio *C*, ſacculis pariter ſucco turgidis excitato, ambitur; amnii ſummitatem occupantis plantulæ prima ſpecies eſt *D*; ſenſim adaucto utero ambiente, amnion pariter *E* tumet, & plantula geminis foliis *F* craſſis excitata, ſupercreſcente gemma *G* adoleſcit, ita ut ſenſim exhauſto amnii *H* humore ſucceſſiva capiat incrementa *I*.

In *lino* 239, ſpecioſa quoq; eſt ſeminalis plantulæ productio; in centro enim colliquamenti, ſeu peculiaris ovi, veſicula *A* primò turget, amnion ſcilicet, cujus concavitatem plantula *B*, ſenſim manifeſtata, tenet. Circumlocatur chorion *C*, utriculis conglobatum, ſucco turgidis. Succeſſivis augmentis plantula *D* binis prædita foliolis humores abſumit, & tandem, velut *peponum* ſemen, excreſcit in formam *E*.

In *leguminibus* parum deviat ab exaratis Natura, & præcipuè in ſativo *cicere* 240, cujus uterus *A*, longiori conſtans tubâ, interiùs ſeminum inchoamenta alit. Hæc primò rudem ſortiuntur formam *B*; parum adaucta

237.

238.



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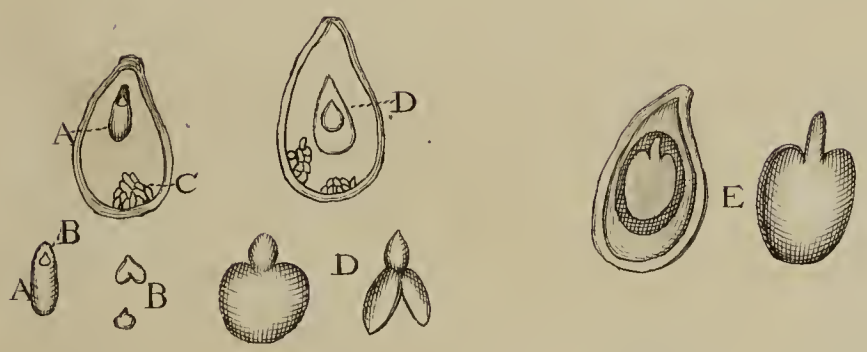

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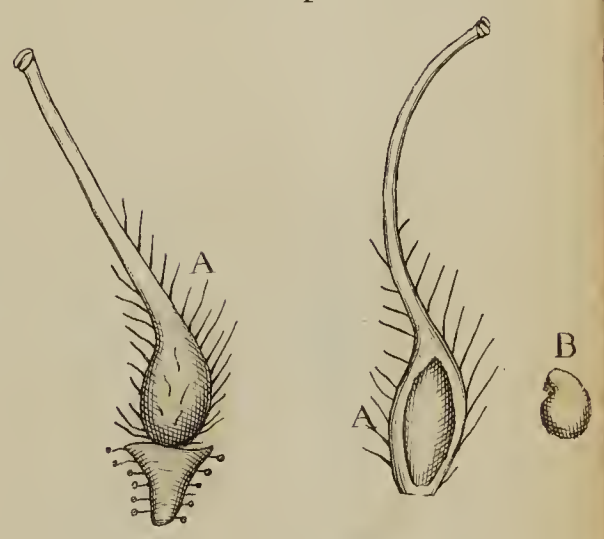

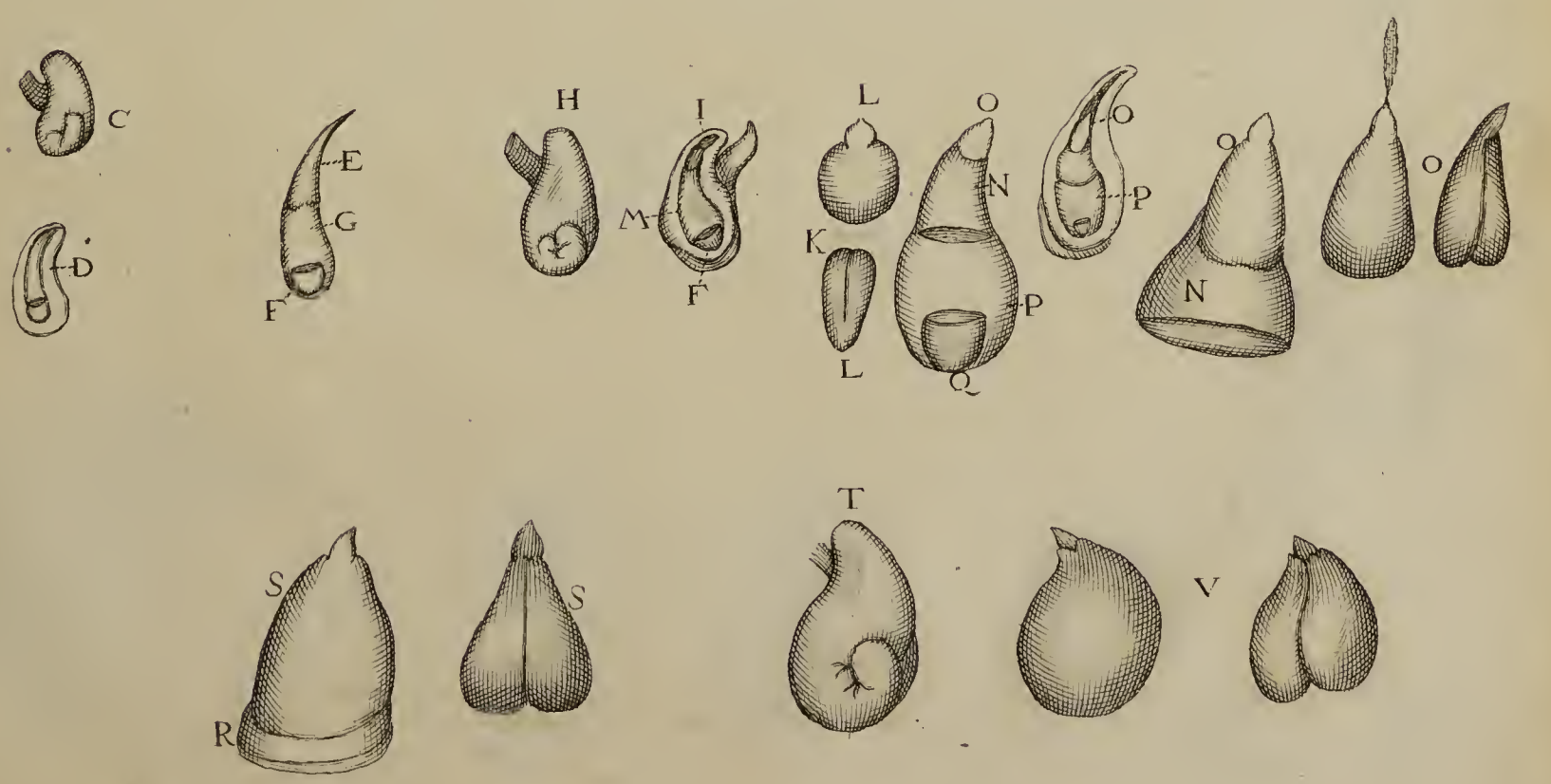

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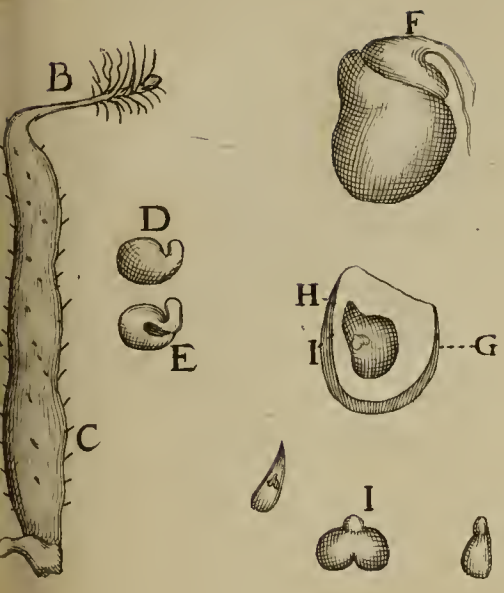

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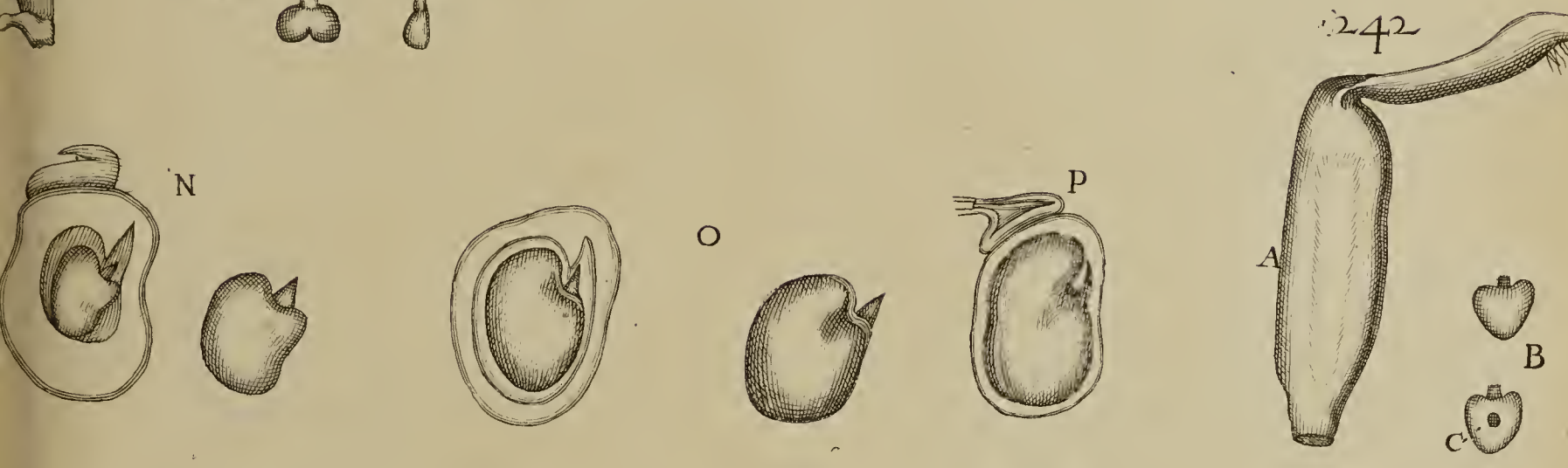

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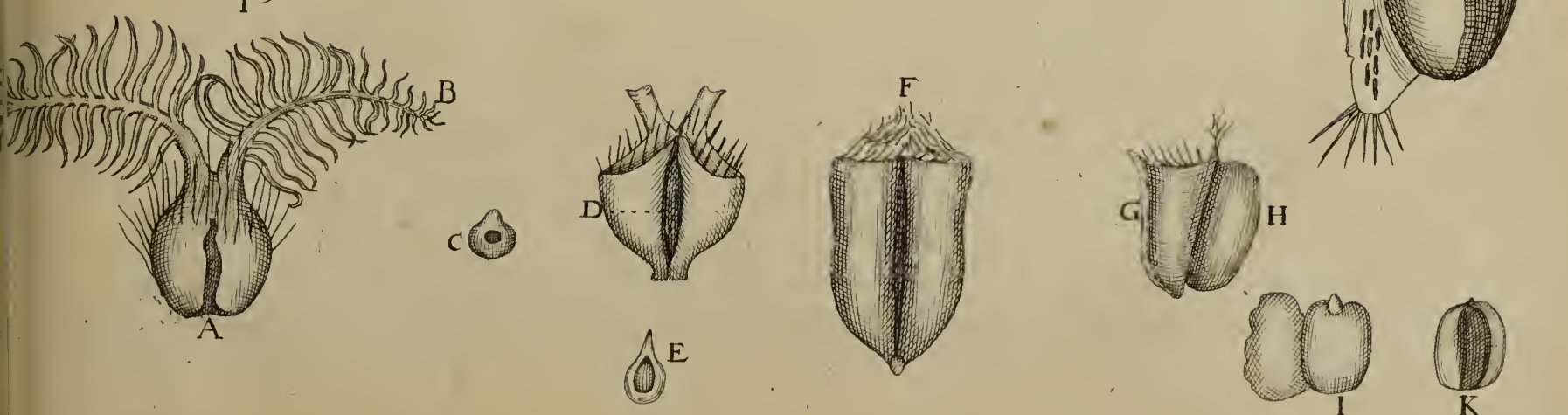


aucta exteriùs rugoſa *C* fiunt, & ſecta per longum exhibent concavitatem *D*, quam veſica replet, in cujus ſummitate amnii incrementum *E* emergit; in baſi verò ſubviridc corpus *F*, concavum cyathi inſtar, locatur; intermedium ſpacium *G*, chorio analogum, colliquamanto turget. Senſim indies ſecundinis *H* adauctis, ſeminalis plantula *I* in chorio primò manifeſtatur; hæc geminis foliis *K* conniventibus, & radice *L*, conſtat. Corpus *F* adhuc viget; & chorii concavitas *M* humore turget. Plantula ſucceſſiva capit incrementa; vitreo enim concretoq; ſucco auctius amnion *N* ſubcreſcenti plantulæ *0* alimentum præbet; unde & chorii *P* arctius redditur ſpatium, & corpus inferiùs locatum *Q* contabeſcere incipit. Tandem parum ſuperſtite amnio *R*, plantulæ moles *S* totam fere occupat aream. Poſtremò ſecundinæ ſuperficies *T* rugoſa redditur, & craſſefactis plantulæ foliolis *V*, interius ſpatium repletur. Toto auctionis tempore ſeminalis plantula, in amnio immerſa, nunquam ſuis foliolis hiat, ſed hæc perpetuò invicem connivent.

Fabæ 241 ſemina eodem pene ordine gignuntur, & adoleſcunt. Papilionaceus flos ſtylum ſeu uterum *A* fovet, viridi excitatum ſubſtantiâ, tubâq; *B* donatum; exteriùs quaſi ſpinæ *C* erumpunt. Contentorum ſeminum figura eſt *D*, & interior fovea *E* excitatur. Succeſſivo incremento augetur ſemen, pendetq; à pediculo *F*. Craſſi ſunt ſeminum parietes, ſeu ſecundinæ *G*, & concavitas cum angulari appendice *H* emergit, colliquamento turgida. In freto plantula *I* geminis contexta foliis manifeſtatur: Senſim adaucta concavitate, quæ amnii vices ſupplet, contenta plantula grandior redditur, varieq; configuratur, ut reliquis iconibus *K*, *L*, *M*, *N*, *0*, *P*, patet. TAB. 40.

Piſorum 242 conſimilis productio ſuccedit. Tenellus uterus *A*, ſeminum inchoamenta fovet, quorum exterior forma eſt *B*, & in ipſorum centro minima concavitas *C*, colliquamento turgida, excitatur. Senſim adaugentur, & acuminatior ipſorum redditur forma *D*; amplior pariter redditur concavitas *E*, umbilico ſeu amnio ſimilis. Craſſefactis ſecundinis *F*, oblongior redditur arctus ille ſurculus *G*, qui laxatur in ampliorem aream *H*, amnio analogam. In ſummitate *G* plantula *I* primò apparet, reliquum verò amnii *H* diaphano turget colliquamento. Augeſcente indies ſemine, amnion cum elongato ſurculo variè configuratur, & incluſa plantula ſenſim adaucta deorſum prolabitur, & ad freti hiatum *K* ſituatur; hæc, ſi extracta luſtretur, formas *L* induit. Gracileſcit ſecundinarum corpus *M*, derivato in amnion humore, qui à plantula abſumitur; hæc ſucceſſivis incrementis *N*, *0*, *P* adaucta, poſtremò totam aream replens, talem ſortitur ſpeciem *Q*.

In avenaceis, & præcipuè in *tritico* 243, ſtylus *A* aſſurgit geminis tubis *B*, parum diſparibus ab antennis, quæ in inſectis attolluntur. In centro uteri, colliquamenti veſicula *C* cuſtoditur; ſenſim contabeſcunt tubæ, & uterus acuminatior redditus, rimulam *D* profundiorem excitat. Contenta pariter ſecundina vireſcens, colliquamentum, ampliori contentum veſiculâ *E*, ambit. Collapſis tubis oblongior jam uterus taliter configu-

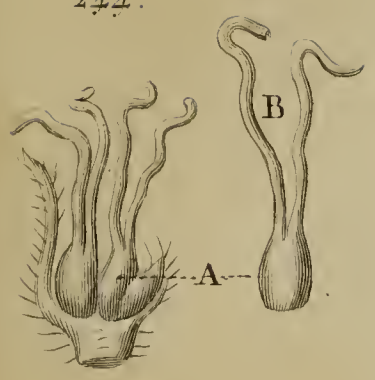
ratur

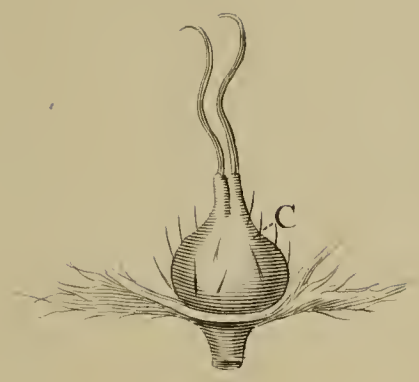
ratur *F*. Gracileſcit interea uteri corpus *G*, cui ſecundina *H* ita hæret, ut quaſi ab ipſo enaſci, & elongari videatur. Contentum colliquamentum in craſſefactam exiguam plantulam *I*, exteriùs gibbam, interiùs verò concavam *K* deſinit, cujus baſi plantulæ conica radix, & gemma adhuc fluida, hærent. Auctius poſtremo ſemen *M*, tabefactum uterum, hìc revulſum *N*, exhibet; reliquum ſeminis *O*, caro & quaſi pericarpium explet, & in baſi ſeminalis plantula *P*, ſuis integrata partibus, cuſtoditur.

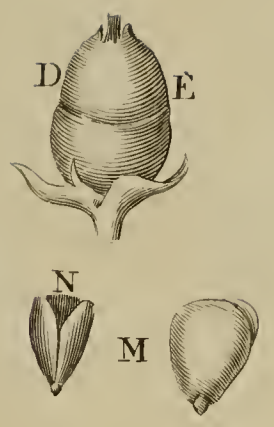
Amentacea pari progreſſu ſua edunt ſemina, ut patet in *avellanis* 244, TAB. 41. in quibus ab apice ſurculorum, ſtyli ſeu uteri *A* multiplices erumpunt, geminis tubis *B*: His tractu temporis contabeſcentibus, auctior quilibet uterus *C* redditur, piliſq; cooperitur; tandem, collapſis tubis, turgidior factus uterus *D*, foliorum eruptiones *E* promit, quæ hìc avulſa indicantur. In ſecto hujuſmodi loculo *F*, qui ſenſim oſſeus redditur, concavitas occurrit; ad hanc à pediculo, lignearum fibrarum & trachearum faſciculus *G* attollitur, cujus extremitati plures appenduntur utriculi *H*, qui interiùs veſiculam, colliquamento refertam, fovent, in cujus centro minimum quaſi ſpatium *I* adeſt, reliquum verò candidis utriculis ſucco turgidis repletur. Interim ſecundina *K* augeſcit, & exteriùs fibrarum productiones *L* exhibet; intus, velut in chorio, cubat plantula geminis foliis *M* ditata, in quorum hiatu amnion *N*, utriculis vitreis excitatum, locatur. Amplior tandem effecta ſecundina *O*, fiſtularum productionibus irrigatur; contenta verò ſeminalis plantula *P* interiùs exiguam ſervat concavitatem *Q*, quâ amnii reliquum *R* cuſtoditur.

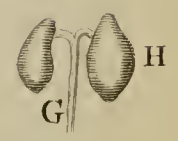
In *caſtanea* 245, detracto calyce à ſtylo, tres aſſurgunt uteri *A*, ſuperſtite adhuc flore cum ſtyliformibus tubis *B*. Vnuſquiſq; *uterus* per longum ſciſſus concavitatem exhibet, quâ plures colliquamenti veſiculæ *C* cuſtodiuntur, multis ſtipantibus pilis; *ſecundinæ* C hærent pyramidali corpori *D*, à lignea portione aſſurgenti. Intra ſecundinas veſicula *E* colliquamento turget, in cujus apice plantula *F* primò emergit, conicâ radice geminiſq; foliis donata, & in *amnii* vitreo humore *G* innatat. Succedente auctione, plantula mutationes ſubit *H*, & tandem adaucta foliola in formam *I* gracillima gibbaq; ſunt, & concavitate vitreum ſervant humorem. Poſtremò, ulteriori augmento fit ſpecies *K*, conſuetâ ſcilicet fructus formâ; craſſefacta etenim gemina plantulæ folia *L*, exterius aſpera, in globoſum corpus companguntur; diductis autem hujuſmodi binis partibus, excreſcentiæ quædam angulares *M* apparent, quibus interior olim concavitas occupatur: Nam foliola plantæ primigenia, olim gracilia, progrediente auctione gibba redduntur, ita ut extremus unguis ſeſe contangat: Cùm igitur ſecundinis coerceantur ſolidis, & à contento amnio nova eiſdem ſeminalis ſubrogetur materia, exarata foliola, interiora versùs, velut appendices & additamenta neceſſariò promunt, & ita abſumpto vitreo amnio conglobatur *caſtaneæ* ſemen. In *nuce* 246, ſeminis progreſſus mirabilis eſt; hujus ſtylus, tenellus adhuc, per medium ſciſſus, concavitatem *A* exhibet, in qua colliquamenti veſicula *B* conditur.

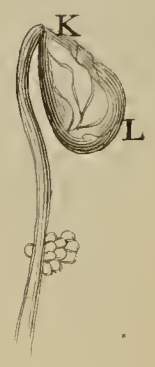
244.

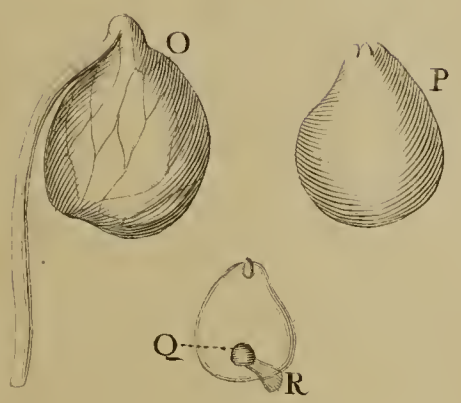












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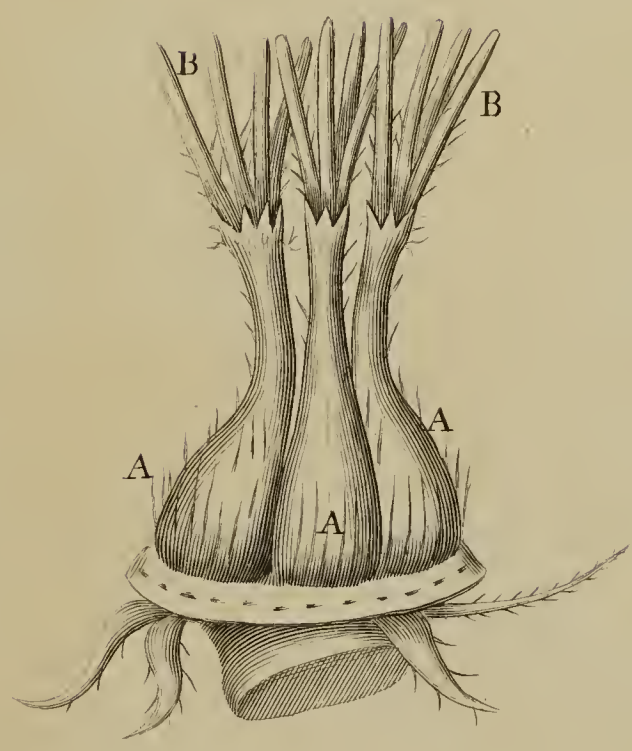

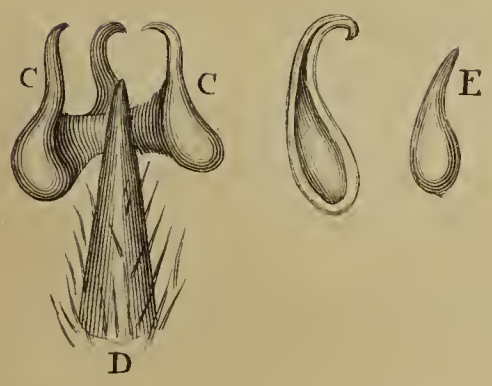

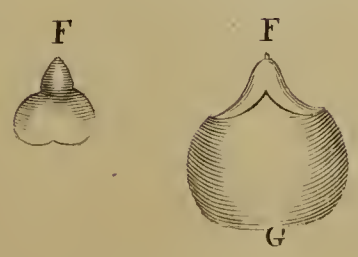

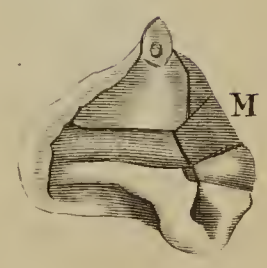

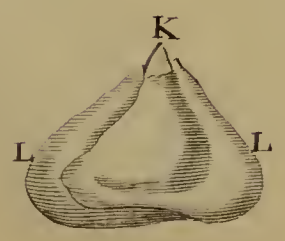

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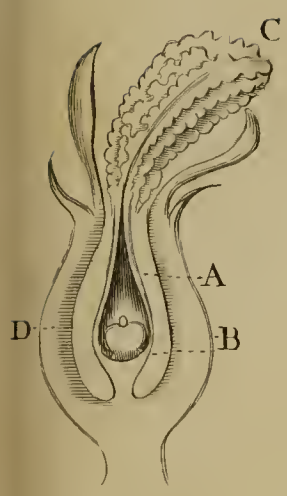
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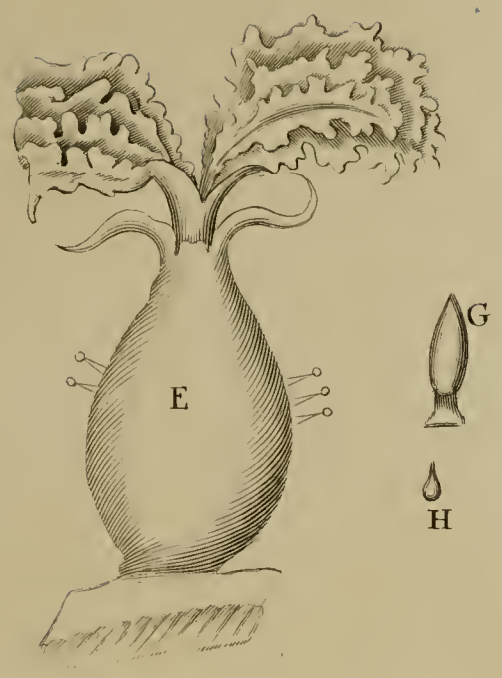
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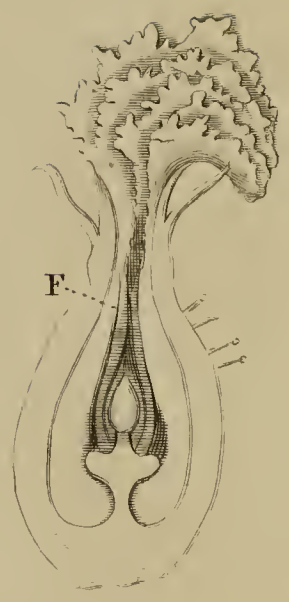
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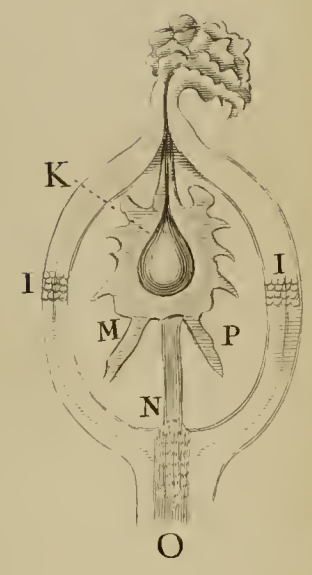
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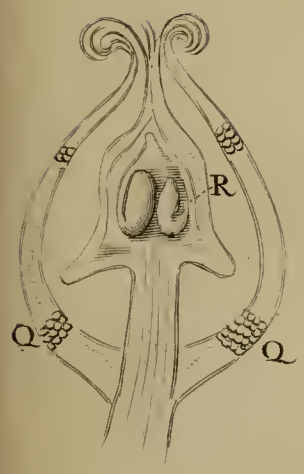
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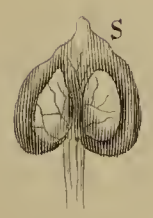
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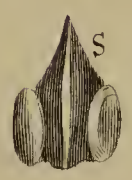
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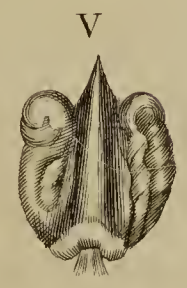
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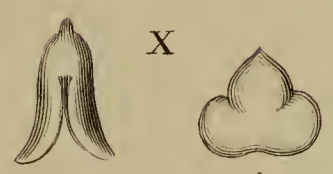
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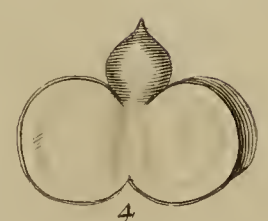
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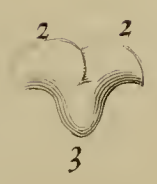
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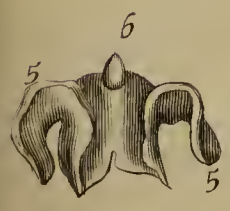
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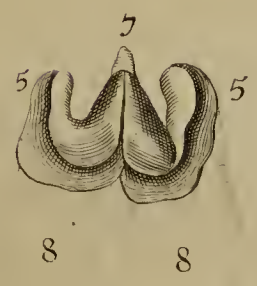
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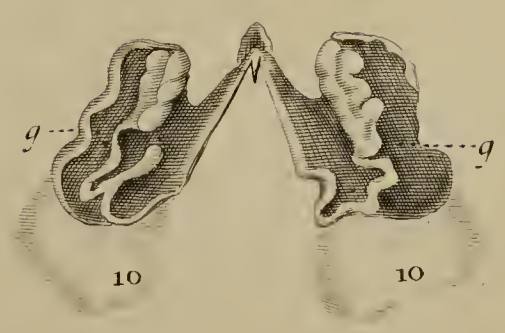
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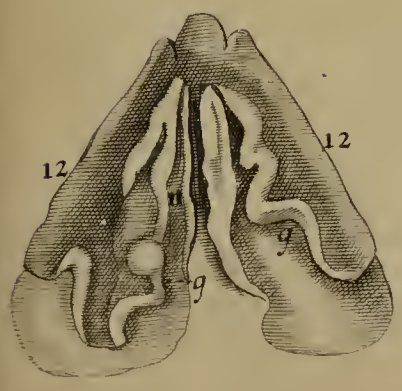
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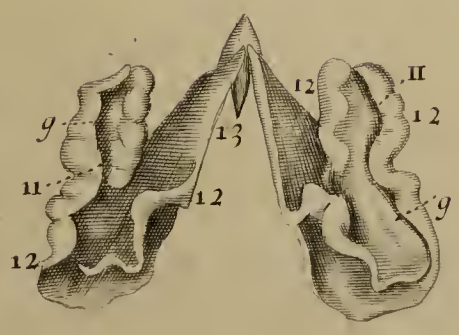
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conditur. Exarata cavitas hiatum habet in tubam, ceu uteri ſpiramenta *C*, quæ criſpis, lactucæ inſtar, foliis excitantur; reliquum uteri corpus *D* rudimenta pericarpii & nuclei continet. Auctior uterus *E* tubas ſervat, & papillis cooperitur; in hoc, ſecto per medium, adhuc patet hiatus *F* in tubas; colliquamenti pariter veſica *G* auctior, in ſui centro utriculum *H* continet. Novo adveniente alimento tubæ contabeſcunt, & pericarpii utriculi *I* turgent; in centro auctior veſicula *K* cuſtoditur; hæc exteriori conſtat ſecundinâ *L*, quæ craſſa eſt, & multiplici utriculorum ordine componitur: Interiùs amnii ſacculus conditur; circa veſiculam *K*, candida quædam ſubſtantia *M*, appendices promens, locatur; hanc percurrit fibrarum & trachearum faſciculus *N*, in colliquamenti veſiculam exporrectus à pediculo *O*; reliquum verò *P*, molli & ſubviridi ſubſtantiâ completur. Brevi temporis tractu exſiccatis tubis pericarpium *Q* craſſius & ſolidius redditur, & nuclei veſtigia emergunt. In centro ſecundina *P* locatur, quæ tumores attollendo variè configuratur *S*, & à candida ſubſtantia *T* ambitur; hæc autem utriculorum pendentibus ordinibus coagmentatur; & pericarpii inſtar ſeu fabaceæ ſiliquæ, fœtum ambit & humectat. Quindecim elapſis diebus, ſecundina *V* auctior effecta, gibboſior redditur; huic interiùs, gelatinæ inſtar, concreti humoris cruſta gracilis hæret, quæ amnii vices ſupplet: Reliquum verò interioris cavitatis colliquamento repletur; hoc igni appoſitum in bene olentem evaporat halitum, levi relictâ cruſtâ. In hoc primò conformata occurrit ſeminalis plantula, cujus forma eſt *X*. Poſt duodecim circiter dies ſecundina exteriorem formam, qualem in perfecto ſemine miramur, jam ſortitur. Amnion *I*, cujus ſuperior portio hîc delineatur, auctius eſt & craſſius, & ſuâ concavitate liquidum chorii humorem continet. Seminalis plantulæ gemina folia 2, grandiora, & gracillima, parum hiant, & intus gemma à caudice 3 aſſurgit: Interim craſſius & amplius fit amnion, depauperato chorii icore; plantula quoq; folia 4 ſuperiora versùs parum recurvat, & contorquet; candida ſunt, & fibrarum trachearumq; elegantem progreſſum exhibent. Semimenſe elapſo, amplior deprehenditur plantula, cujus unumquodq; folium geminas plicaturas 5, ex reflexa molli ſubſtantia versùs ſuperiora patitur, unde binos plantulæ proſpectus exaravi: In 6 enim unicum occurrit folium; in 7 gemina adſunt, à quorum concavitate mucoſum pendet amnion 8. Brevi criſpa redduntur folia, & elongantur; unde, levi diductione, ipſorum hiatus 9 in ſingulo patet folio, & ipſorum concavitatem amnii moles 10 occupat. Tandem completo ſemine ſciſſura 11, olim patula, ferè obturatur, conniventibus folii partibus 12, quibus tabefactum clauditur amnion. Gemma pariter 13, diductis foliis, emergit, cujus ſtructuram ſuo loco indagabimus. Hoc itaq; ſucceſſivo incremento craſſiora redduntur plantulæ folia, & ita conglobantur, ut ferè ipſorum natura obſcura reddatur, alienámq; induat formam.

Mirabilis itaq; & reliquis viventium productionibus analoga eſt *ſeminum generatio*, quam in diverſis contemplati ſumus: Primò enim *umbili-*

cus occurrit, qui manifestò perforatus est, ut vidimus in *cucurbita*; sensim laxatur in extremitate, & recollecto colliquamenti icore, fit analogus *amnio*, quod in fabis fluidum est, in reliquis, utriculis coercitum, molem diversæ figuræ excitat: Tractu temporis semen, ceu fœtus, emergere incipit, in apice scilicèt amnii, supereminentibus binis foliolis alarum instar apertis, & frequentissimè diductis, ità ut angularis amnii apex sciſſuram impleat; à foliis verò & alis, acuminatum minimumq; consimilis substantiæ corpus assurgere patet: Hæc itaq; plantulam, radice, trunco seu gemmâ, & binis foliis constantem, probabiliter indicant. Successivo incremento auctior reddita amnii moles, fœtum quoque seu plantulam auget, & fovet. Amnio circumaffundi utriculorum ordines, *chorii* instar, in pluribus patuit: An verò in *siliquaceis* contentus humor, à secundinis, multipilici organorum structurâ donatis, instillatus, *chorii* vices suppleat, multum probabilitatis habet; certum etenim est, *chorium*, in quibus adest, & *secundinas* in leguminibus à primordiis turgere, sensimq; adaucto *amnio* exinaniri, & postremò à plantula amnion, in quod percolantur omnia, absumi. Quare probabilitèr seminalis humor primò ex secundinis in umbilicum, & sensim in laxatum amnion derivatur; unde prima plantulæ delineatio.

Augetur autem probabiliter amnion, non tantum submini-strato succo ab umbilico, sed & transudante humore à chorio, cùm tractu temporis obliteretur umbilicus: Et cùm plantula seminalis non tantùm in exaratis, sed & in reliquis, peculiari umbilico destituatur, quo exteriùs adveniens alimentum altè ipsam penetrans, in singulas diffusus partes, augeat & alat: Sed ut plurimùm contiguus amnii humor foliorum hiatum repleat, ipsisq; hæreat, non incongruum fortasse rationi erit censere, filitatione transductum chorii humorem in amnion, tandem plantulæ folia, inversâ nutritionis viâ, subingredi, ex his in caulem & gemmam derivari. Quid simile in *Animalium* fœtibus accidere putabat *Alcmæon*, quod nostro etiam sæculo in lucem revocatum vidimus: Per cutis enim poros icoris portionem subingredi verisimile est; eamq; miscelam, quæ in vena cava & pulmonibus celebratur in infantibus extrà uterum, cutaneas venas subintrans humor cum refluo sanguine molitur. Seminalis plantulę in exarato ovo generationem inter Naturæ arcana reponendam esse videtur. Licebit tamen hæc cursim meditari: In *Animalibus* scilicet Naturam consuevisse *sexum* multiplicatis individuis addere, quorum unum colliquamentum ministrat, & ovum; alterum verò icorem aspergit, in quo fortasse activum viget principium, cujus ope partes diriguntur, & quasi magneticè debitam inclinationem acquirunt. In *Vegetantibus* autem, ubi non est tantus organorum apparatus, & cuilibet sensibili particulæ omnia insunt, quæ in toto deprehenduntur, nullâ intercedente generatione, abscissi quicumq; rami frequenter in novam sobolem excrescunt; vel Naturæ ministerio deciduæ minimæ & compendiariæ plantulæ à tenellis surculis sub seminum specie propagationem quocumq; anno perpetuant: Particulæ enim activæ Vegetantium, inclinationem & coordina-

tionem

tionem adeptæ, quaſi è reticulari folliculo effluentes, de facili invicem adaptantur; unde plantula compaginatur, rectæ ſcilicet fiſtulæ cum appenſis utriculorum ordinibus.

Quid ſimile miramur in *Metallorum* & *Salium* concretione; in *Fungis* ipſis, & *Arborum* extraneis *tumoribus*, in quibus particularum perpetua coordinatio eluceſcit. Probabile igitùr videtur, Vegetantium particulas, quæ talem inclinationem & directionem in trunco & ramis ſortitæ ſunt, quotieſcumq; à propriis canaliculis effluunt, eandem conſervare, & manifeſtare; &, quoniam in ramum, vel ejus rudimentum dirigebantur, in gemmam ſcilicet; ideò recollectæ & conglobatæ, minimi ſurculi compendium efformant, quod mox in folia laxatur; hoc à toto deciduum & ſeparatum, ſuoq; alimento circumdatum, quaſi filius emancipatus, ſuis præeſt muneribus, & vulgariter *Semen* dicitur; à nobis autèm *Seminalis plantula*. Hinc videmus, cauliculi apicem, ſeu extremam radicem ſeminalis plantulę ferè ſemper fiſtularum parentis arboris hiatum reſpicere, & ab ipſo parùm diſtare; reliquum verò velut rami inchoamentum, ſeu tenellum ſurculum, parùm elongari, ejuſque extremitatem minimâ gemmâ condecorari, cui, ut de more, bina adſtant folia lata, quæ ſeminis carnem excitant. Erit igitur probabiliter Semen quaſi gemma pendula, & decidua, alieno germinatura ſolo.

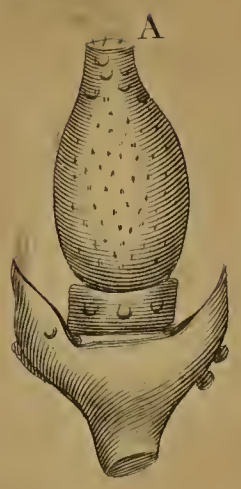
De

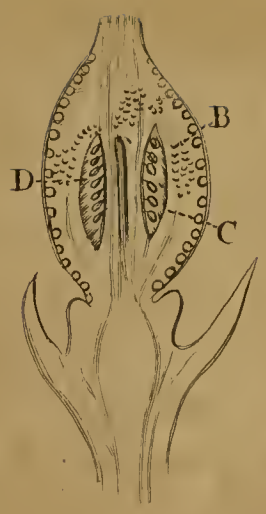
De Uterorum Augmento, & ipſorum ſuccedente forma.

EXpoſitis incrementis, contentum Semen in ſtylo ceu Utero debitas ſubit mutationes, donec perfectâ & completâ organizatione, veluti filius emancipetur. Nec ſoli Semini contingit augmentum, ſed Natura in pluribus Uterum ſucceſſivè auget, pluraq; circum-turgere jubet fœtûs gratiâ. Ita in *piro*, *pomis*, *ceraſis*, & ſimilibus, contingit, inducto pericarpio utplurimùm, vel oſſeo cortice, vel alio analogo tegumento. Varia eſt Naturæ methodus in producendis hujuſmodi Uteri appendicibus & integumentis. Primò itaque, ubi calyx humilis eſt,& exiguus uterus, in longum producitur ſtyli elongata tuba. Hoc apprimè experimur in *citris*,
TAB. 43. & *malis limoniis* 247, quarum uterina extuberans tuba *A* ſenſim contabeſcere incipit, utriculi autem corticis *B*, turgidiores redditi, pericarpium exterius augent, & circa ſeminum capſulas *C*, veſiculæ avido ſucco turgidæ *D* emergere incipiunt. In ſiliquaceis, & præcipuè in *piſis* 248, exſiccato calyce, & uteri tabeſcente tubâ *A*, reliquum corpus, pericarpii inſtar auctum delineatas ſucceſſivè formas *B*,*C*,*D*,*E* exhibet. In floribus, ubi calyx gracilis eſt, & longè ab utero diſtat, pericarpium, reliquaq; ſeminibus parata involucra, circa ſtyli baſim ſuperexcreſcunt, gracileſcente calyce. Hoc in *prunis*, *malis Perſicis*, *Armeniacis*, & *amygdalis* 249 patet, in quibus calyx *A* exſiccatur, & intus ſecundinæ *B* turgent; tuba verò *C*, ſenſim exſiccata, contorquetur; turgente verò pericarpio *D*, ex toto contabeſcit, & ſectus uterus primò exhibet fibrarum lignearum, & tracheæ cylindrum *E*, qui per longum pediculi exporrigitur, & in calycis productione dilatatus, angulos *F* efformat; mox iterum conſtringitur, & tandem productis ramulis oſſeum nucleum *G*, & pericarpium *H*, admodum gracile, irrigat; in ſeminis pariter capſula *I*, quæ in centro cuſtoditur, propagines deducuntur; obliteratâ tandem tubâ, in adaucto utero *K* exarata manifeſtiora redduntur, & ſecundinæ utriculi *L* turgidiores fiunt. Poſtremò obtuſior & grandior fit fructus *M*, & auctâ interiori concavitate, ſeminiſq; veſiculâ, nucleus dureſcere incipit juxta exteriores laminas *N*, & circa pericarpium augetur. Pari progreſſu molitur Na-
TAB. 44. tura *uvæ ſpinæ* 250 augmentum, cujus calyx *A* tabidus & exſuccus redditur; uteri verò ſubjecti corpus *B*, emergentibus utriculis pericarpii *C*, fit pro cuſtodiendis copioſis ſeminibus *D* craſſum indumentum. In aliis, tubæ corpus primævam ſervat gracilitatem; circumſtans verò calyx in naturam fructûs tranſit: Ita in *piro* 251 præcipuè obſervatur, cujus copioſi uteri *A*, in centro locati, hinc inde quaſi calyce *B* circumdantur; tractu temporis ſuperior tantùm portio calycis *C* contabeſcit, vel ſaltem non adoleſcit; reliquum verò in pericarpium *D* excreſcit. Novo adveniente alimento, contabeſcentibus uteri tubis, laterales calycis parietes *E* craſſefacti invicem approximantur, & ita fit forma *F*. Idem miramur in *pomis* 252, in quibus copioſi uteri *A*, craſſo calyce *B* non longè circumdantur; ſenſim anguſtato uterorum ſpacio craſſius redditur pericarpium *C*,

quod

247.





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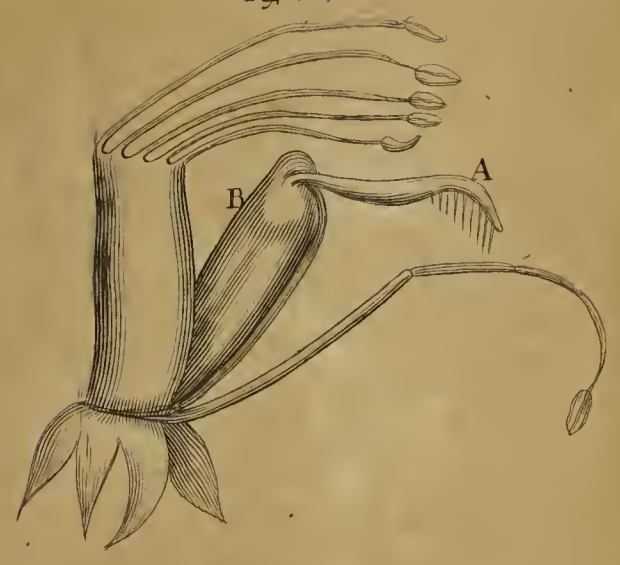

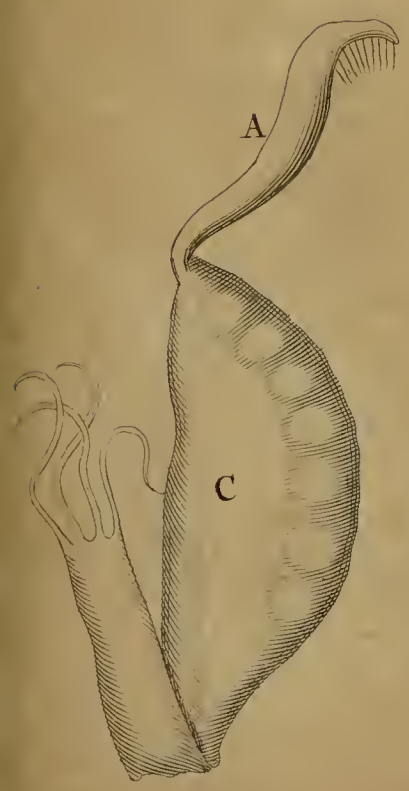

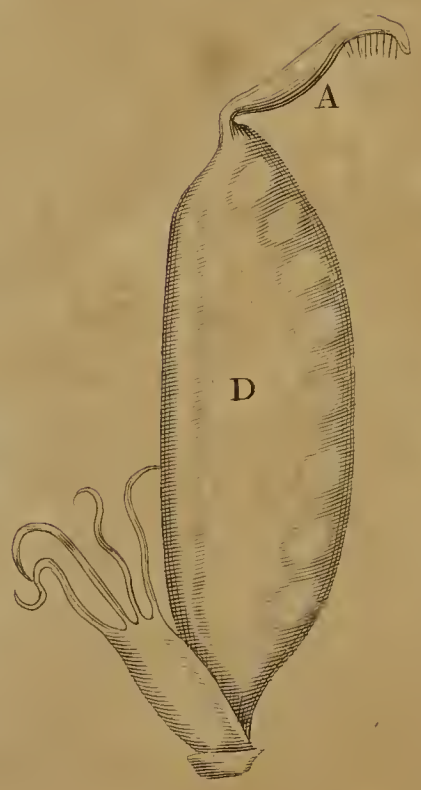

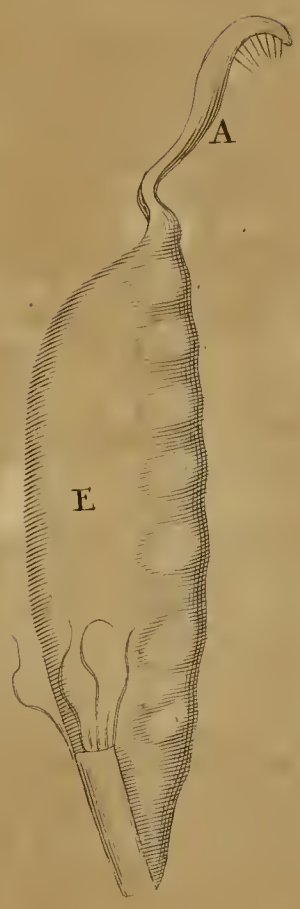

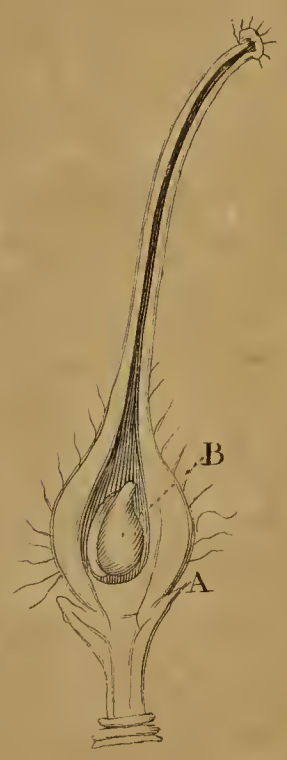

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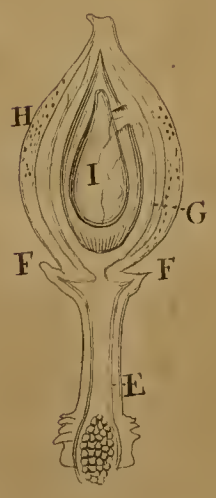

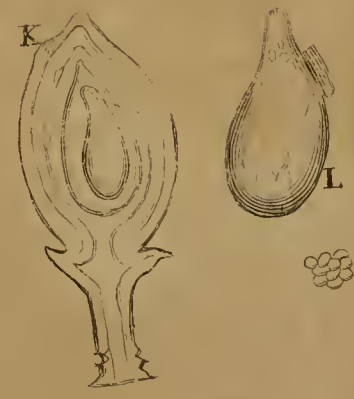

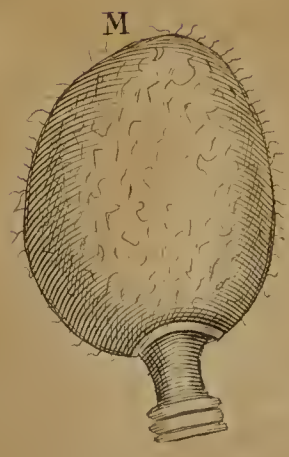

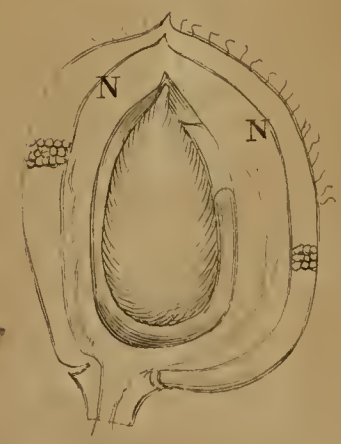

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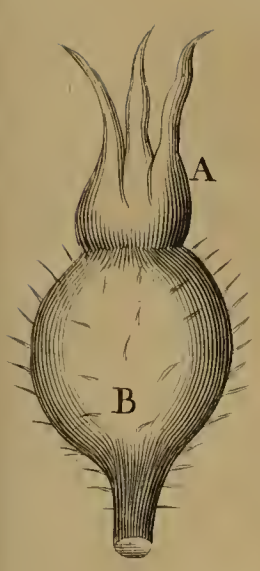

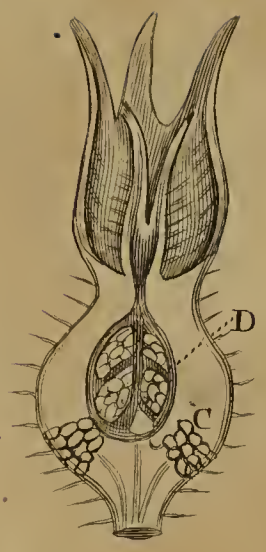

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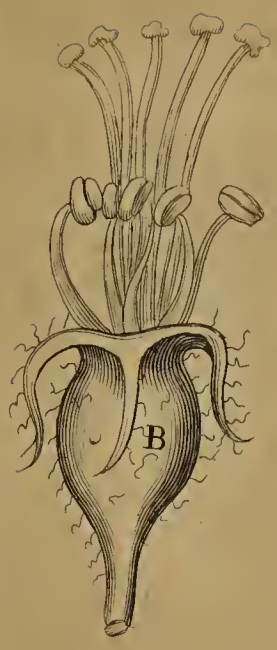

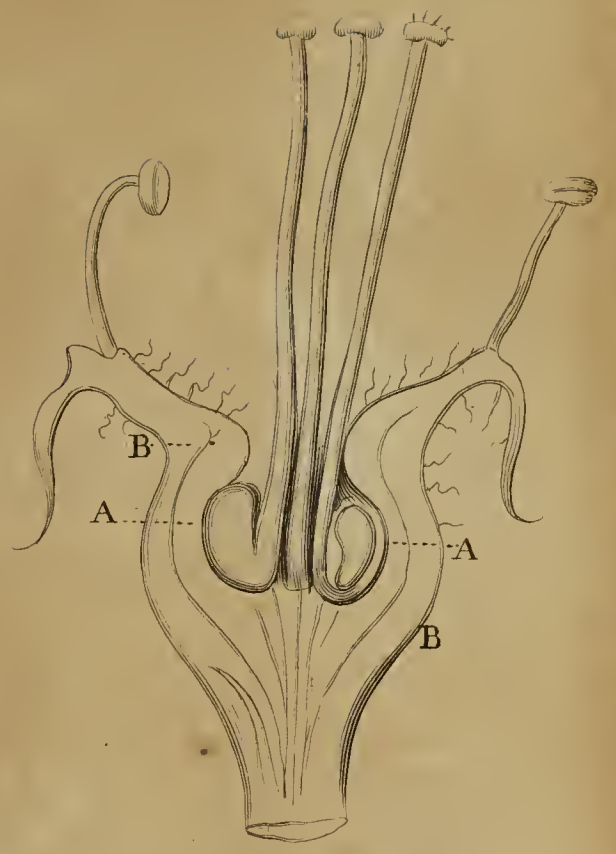

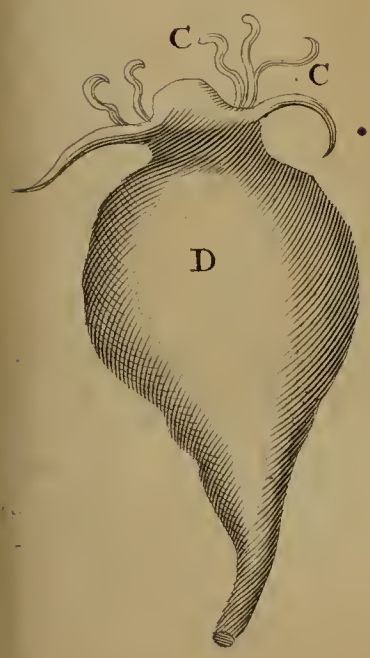

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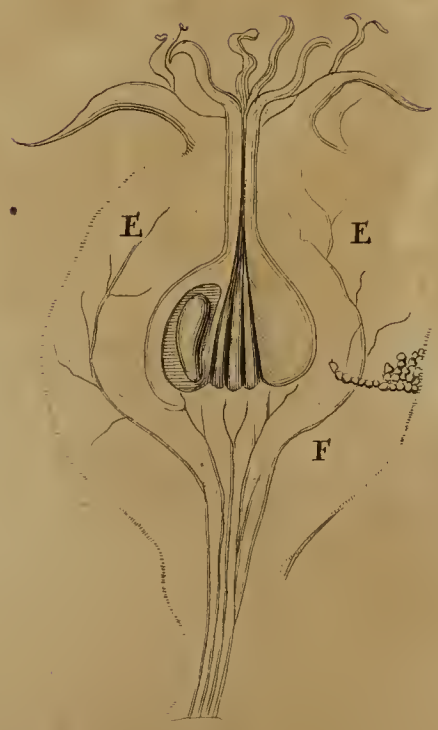

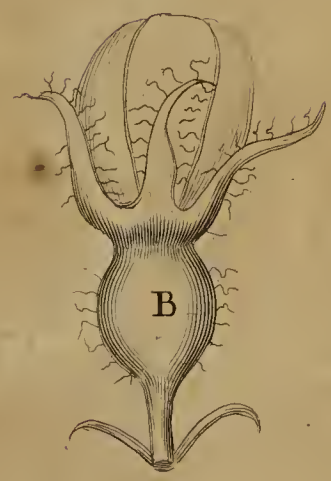

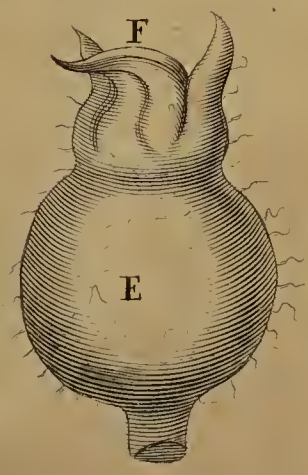

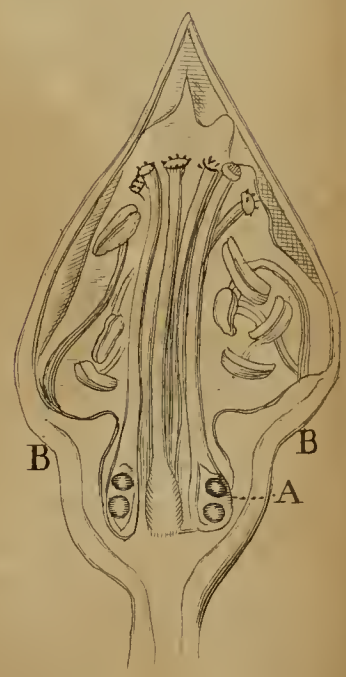

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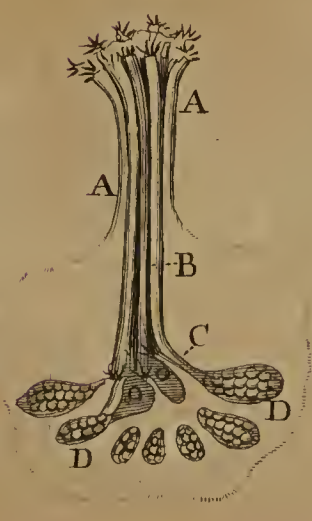

Tab XLV

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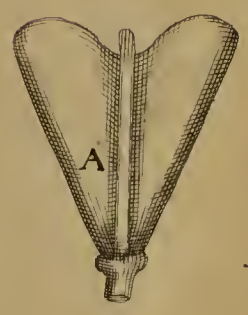

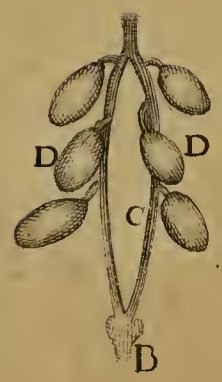

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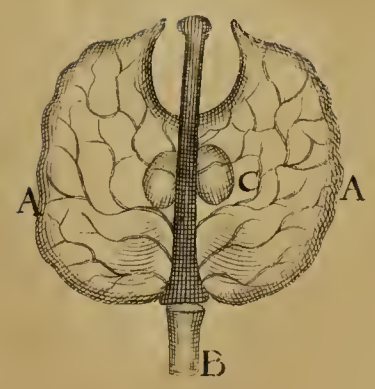

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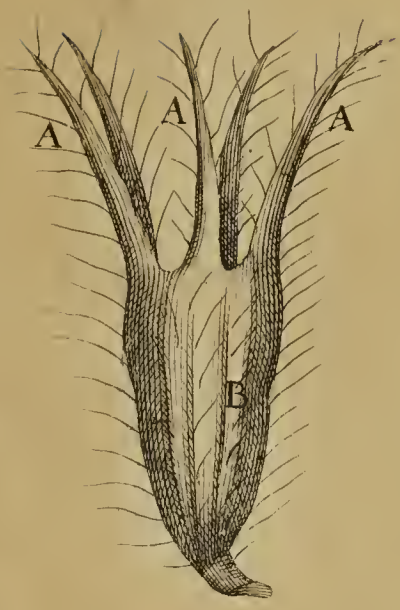

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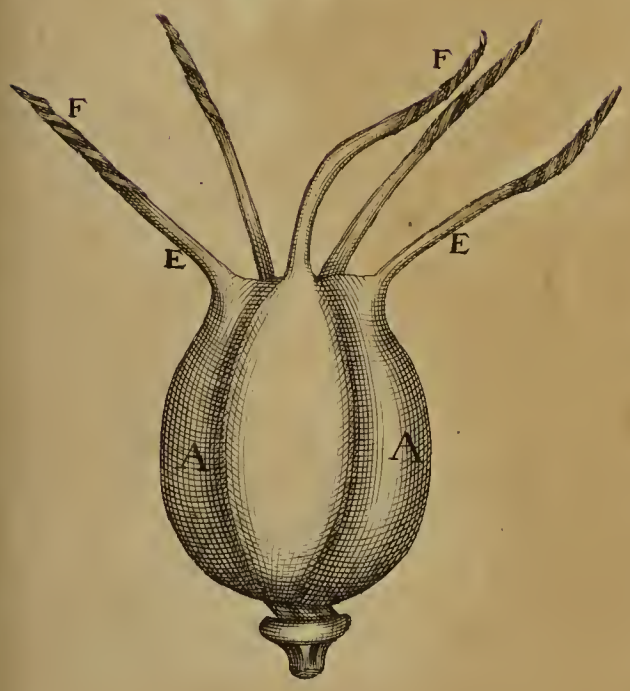

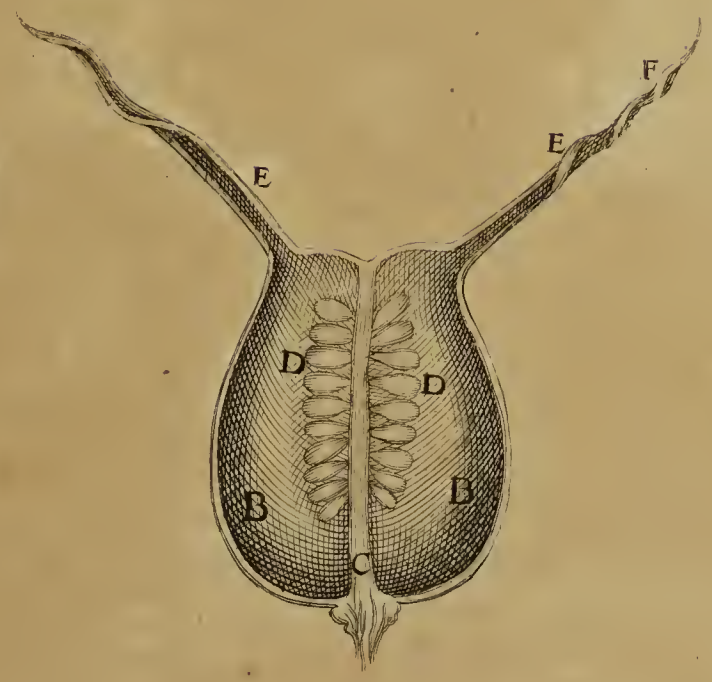

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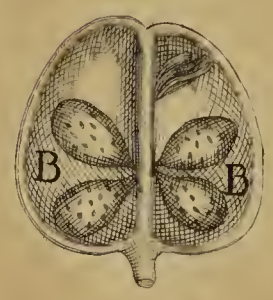

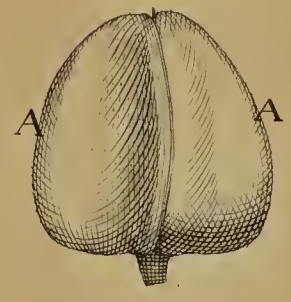

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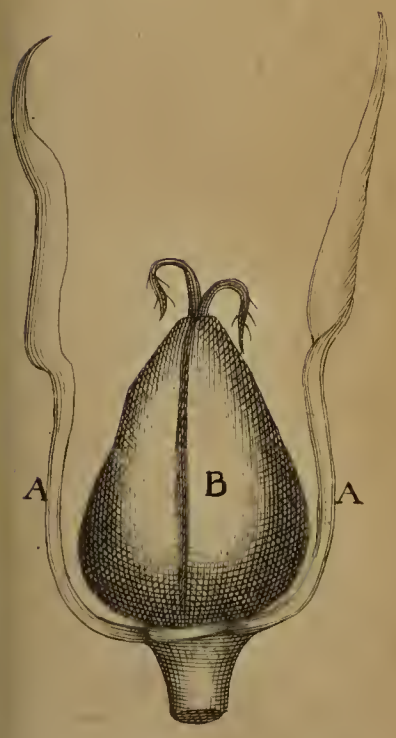

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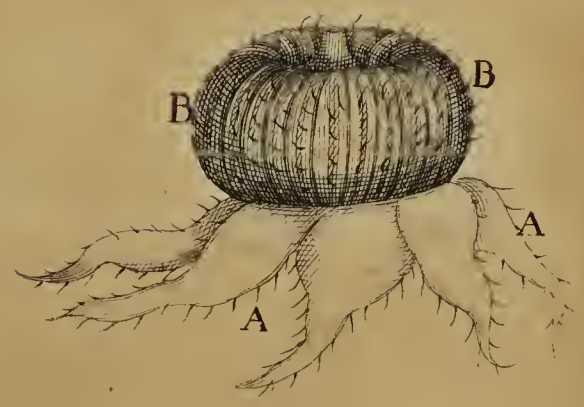

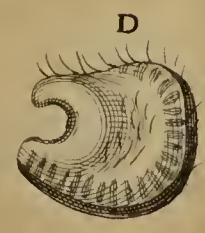

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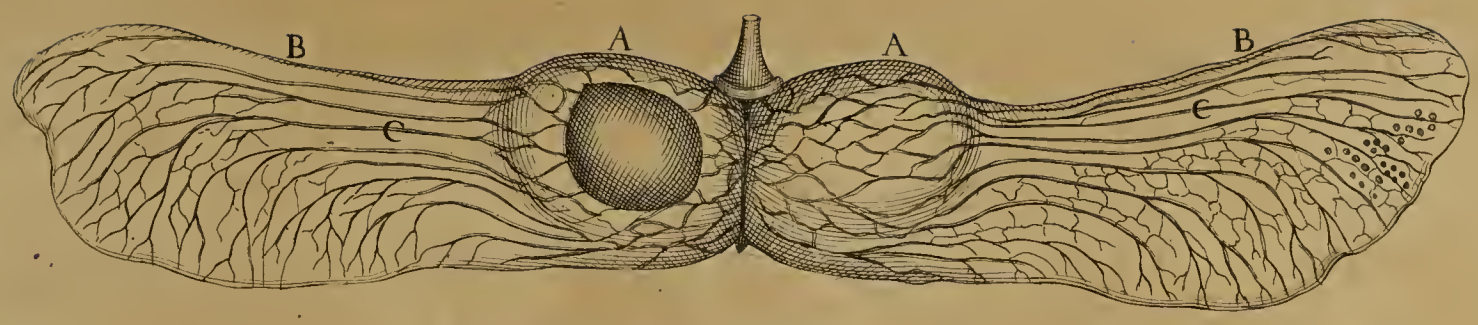

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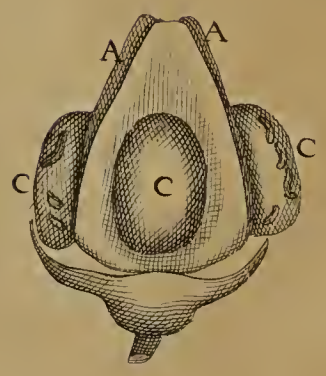

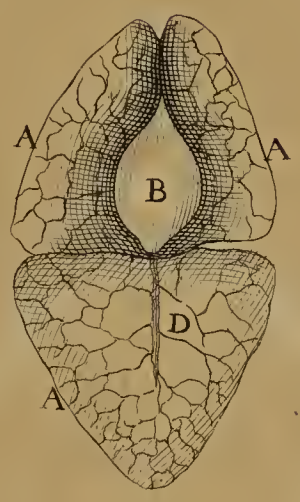

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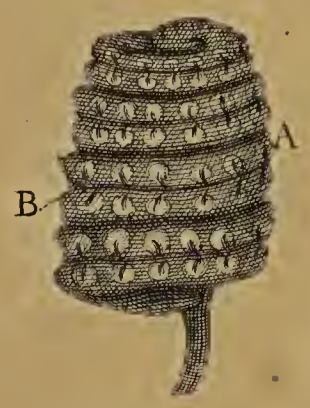

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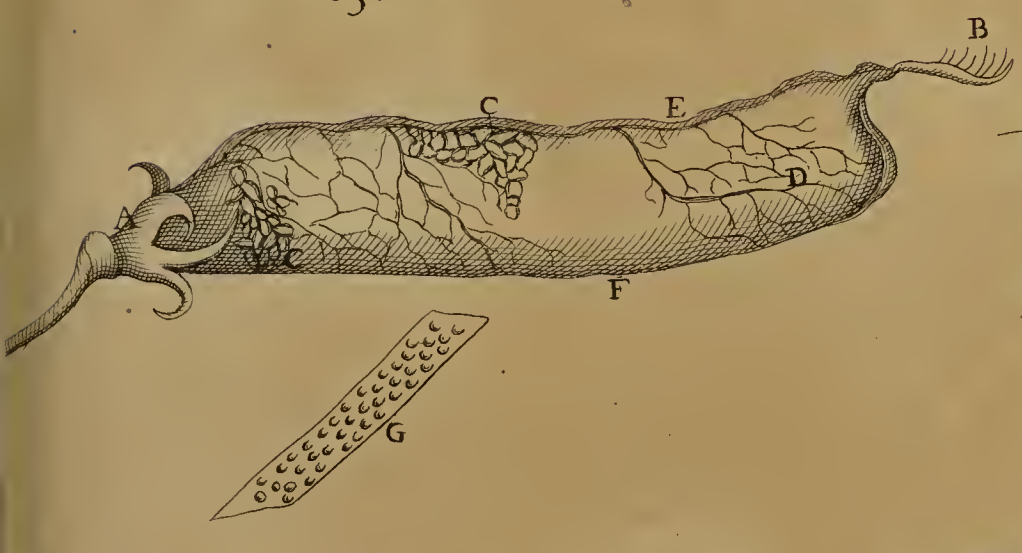

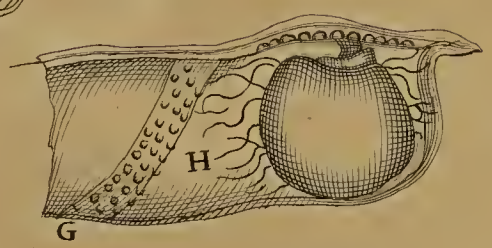

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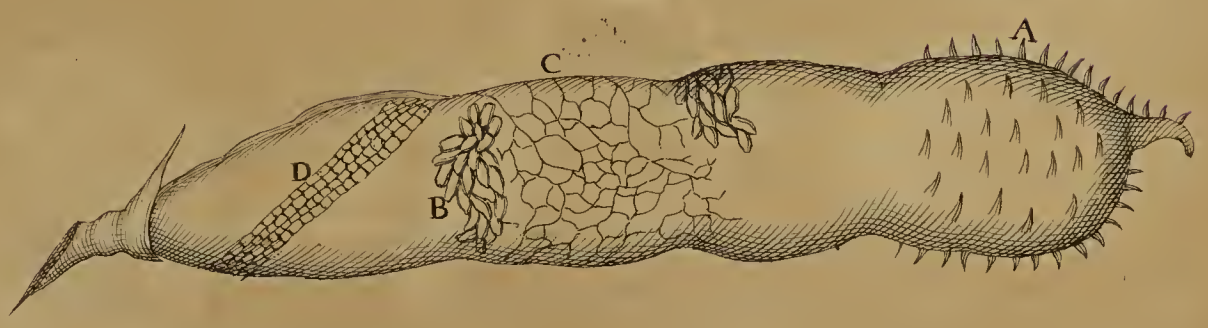

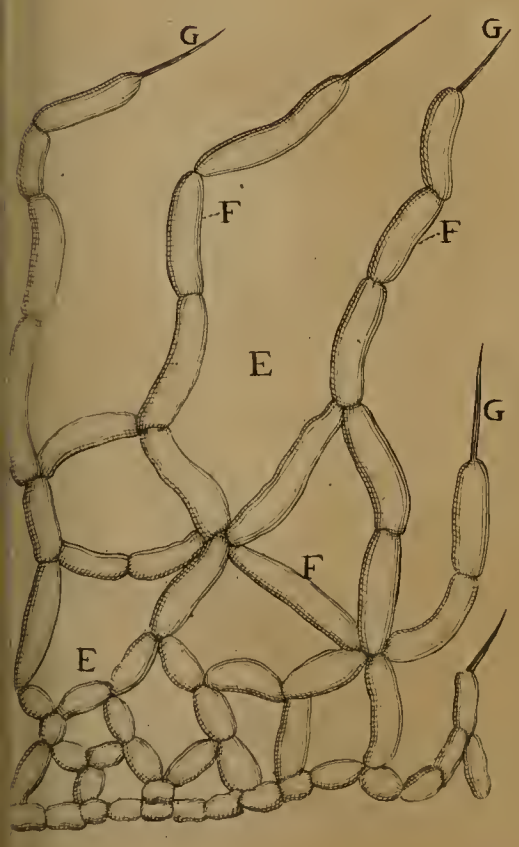

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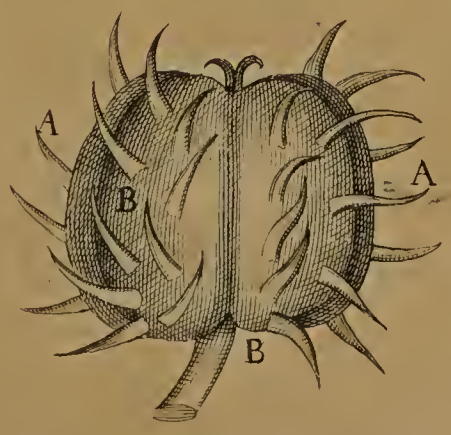

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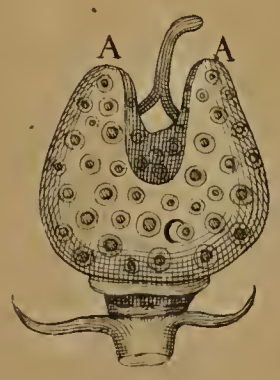
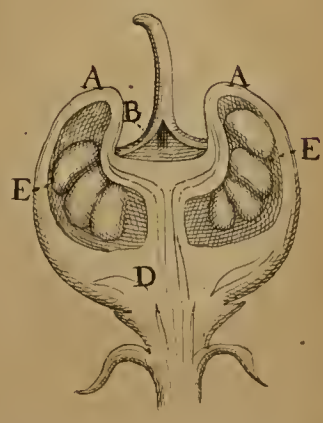




quod tractu temporis ſecundùm ſuperiorem partem *D* magis àpproximàtur, & reliquo corpore ita augetur, ut in rotundam formam *E* excreſcat, gracileſcente contracto jam calyce *F*, & Uterorum extremis tubis, quæ à ſubcreſcente pericarpio *G* urgentur. In *pomo granato* 253, licèt Seminum videatur confuſa congeries, attamen interdùm licuit in tenello diverſorum attingere Uterorum cumulum. In ſtylo namq; ſecto per longum, uterinæ tubæ *A* eminent, inter quas hiatus *B* adeſt pro loculorum perſpiratu; in centro autem ſtyli, ſeu fructûs, tubarum inchoamenta *C*, quę debitam non ſunt ſortita proceritatem, foràs errumpere nequeunt; unde concluſa, adauctis ſeminibus & pericarpio interiùs conduntur. Tubis his continuantur peculiares concavitates *D*; unde tota Fructûs compages eſt Uterorum coalitus & coagmentatio.

Longum eſſet ſingulorum Uterorum incrementum deſcribere, unde exarata, pro Naturæ eruenda norma, ſufficient, nobiſq; contemplantibus diverſas conformationes uterorum, quibus cuſtoditur etiam poſtmodùm jam productus fœtus, iidem occurrent. Maturatâ namq; latitantis ſeminis naturâ in quibuſdam arboribus, & herbis pericarpio donatis, petiolorum inſertio exſiccatur & concidit; in aliis diveſâ viâ areſcere incipiunt, tandemq; ſolo iterum concreduntur. Tam variè igitur configurat Natura uteros, ſeu ſeminum capſulas, eaſq; augendo à primæva ſtyli conformatione diſſimiles reddit, ut penè impoſſibile mihi ſit, præcipuas etiam, & ſpecioſiores exponere ſpecies; attamen, ut Naturæ artificium in architectandis hujuſmodi *Uteris* ſubindicetur, præcipuas ſpecies, haſq; ſimpliciores, deſcribemus.

Primò itaq; ſimplex occurrit *burſæ paſtoris* 254 loculus, ſeu Uterus; hic membraneo quaſi conſtans corpore *A*, in levem attollitur tumorem. A petiolo *B* interiùs producuntur gemini fibrarum faſciculi *C*, taliter curvati, à quibus, pediculis mediis, ſemina *D* pendent. *Thlaſpi* 255, pariter Uterus binis conſtat membranis viridibus *A*, quæ exiguum relinquunt ſpatium geminis contentis ſeminibus. A pediculo *B* emergunt fibræ *C*, reticulariter inoſculatæ. *Lagopus* quoq; 256 multiplici donatur Utero, qui olim veluti calyx flori ſubſternebatur; quinque eminet appendicibus piloſis *A*, reliquo tubuloſo corpore *B* ſemen cuſtodit. *Melanthii* uterus 257 in inſignem attollitur molem; loculus itaq; fit quinq; protuberantibus cellulis *A*; hæ propriis gaudent ſepimentis *B*, tenui membrana excitatis; hiſq; pendentia à coſtula *C* ſemina *D* cuſtodiuntur: Singula quæq; cavitas perforatâ gaudet tubâ *E*, quæ in apice in ſpiram *F* contorquetur. In *Mattioli hyacintho* 258 tribus diſtinctis cellulis *A* conſtat Uterus, parieſq; parum craſſus eſt, utriculis conſtans. In quolibet loculo quatuor conduntur ſemina *B*. *Gittago* 259 ſuprà exſiccatum calycem *A*, uterum *B* effert, in cujus concavitate taliter aſſurgentes pediculi *C*, ſemina *D* ſuſtinent, & alunt. In *lino* 260, delapſis tubis, tandem fit uterus, pluribus coagmentatus loculis *A*, propria ſemina cuſtodientibus. In *Malva* 261, conſumptis pariter copioſis uterinis tubis, remanent ſuprà floris calycem *A*, copioſiſſimæ ſeminum capſulæ *B*, versùs centrum ſituatæ, ita ut ro-

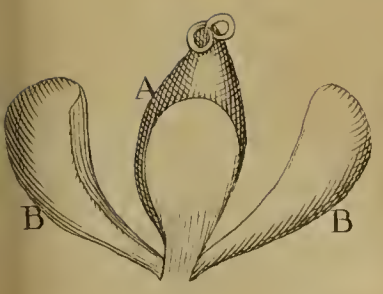
TAB. 45.

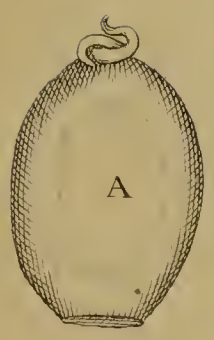
tundus fiat ex disparatis uteris acervus. Hærent autem expanso pediculo *C*, & singuli Uteri figura est *D*, quâ secundinis fovetur semen. Elegans est
TAB. 46. *opii* 262 Uterus, quem copiosè pendere voluit Natura; gemina itaq; locatur exigua cellula *A*, cui geminæ alę *B* insignes gracilesq; appenduntur: In has derivantur per exteriorem membranam fibrę *C*, cujus extremitatibus globuli hærent. *Lapacii* 263 Utero Natura custodiam paravit; tres itaq; membranę *A*, foliorum instar, rudem efformantes triangulum, uniuntur, invicemq; aptantur, ut contentum semen *B* custodiatur: In singulis hisce membraneis tegumentis, seu potiùs uterinis alis, interiora versùs curvatis, locatur ovale corpus *C*, utriculis constans, quod specie seminis imponere potest; hoc tamen peculiare pericarpium est, tractúq; temporis contabescit. Omnes alę fibris ligneis, & tracheis *D* irrigantur. Elegantissimus est *Medicæ sylvestris* Uterus 264; oblonga enim uterina concavitas quasi siliqua in spinam *A* contorquetur, & plura custodiuntur semina. Exteriùs crassa affunditur duraq; substantia, & in aliquibus spinæ, quæ à fibrosis propaginibus *B* irrigantur.

In quamplurimis herbis, & arboribus, Uterus longiori constans formâ, in siliquaceam vertitur naturam; unde parùm gracili membranâ excitatas siliquas observamus; in reliquis verò, quasi inducto pericarpio, crassius additur operimentum, & tutamen: Hujusmodi formam passim deprehendimus in *pisis* præcipuè 265, quorum adaucta siliqua è floris calyce *A* elongatur, & apice suo exsiccatę uterinę tubę B vestigia servat: Color viridis est, parumq; pallens. Componitur siliqua exteriùs ovalibus utriculis *C*, parùm tamen sese angustantibus; unde anguloſi interdum redduntur; qui verò interiorem regionem occupant, minores sunt. Totus paries, reticulari opere *D*, ex tracheis, & fistulis ligneis irrigatur, derivato à fibrosis fasciculis, superiorem *E* & inferiorem costulam *F* percurrentibus. Versùs interiorem partem per transversum excurrunt quasi ligneę fibrę, rotundis excitatæ globulis prout, ruditer & obcurè observantur; hæ teguntur substantiâ quadam molliori, quæ quasi tot syphonum ora *G* indicare videtur; ab interiori pariter siliquę superficie eminent pili molles *H*, & quasi capillamenta, quibus humectantur contenta semina *F*. *Lupinorum*, & *fabarum* 266 præcipuè, siliquæ crassiori constant corporaturâ: Hujus forma oblonga est, & tumores, ubi semina conduntur, exhibet. Exterior superficies pyramidalibus papillis *A* cooperitur; sub cuticula pariter utriculi *B* fibroso reti *C* appenduntur, quo tota substantia irrigatur. Succedunt pariter rectę quasi fibrę *D* per transversum locatæ, rotundis conglomeratæ corporibus minimis. Ab interiori siliquę superficie pendent veluti pericarpii elongatę appendices *E*, oblongis utriculis *F*, succo turgidis, excitatæ: Harum centrum ligneę fibrę *G* excurrunt, & invicem implicatę molliter fovent, & fulciunt contenta semina. Solet frequentissimè Natura uterum pericarpio, hoc est, utriculis succo turgidis donare in seminum custodiam; ita in pluribus, & præcipuè in *cataputia majori* 267 eminent copiosi uteri, qui mollibus pilis & quasi aculeis *A* exteriùs muniuntur, & sub cuticula non valdè

crassum

269.





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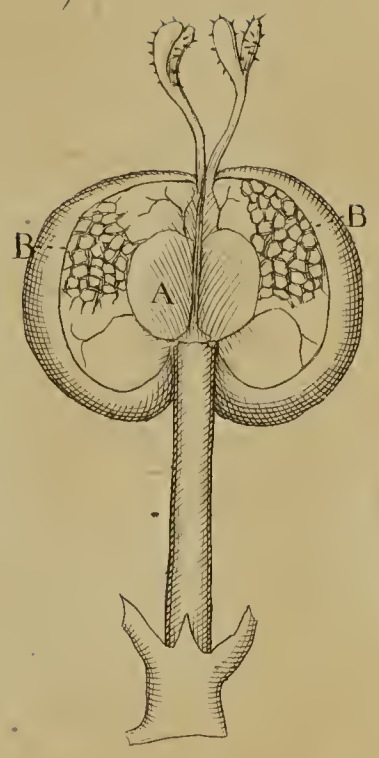

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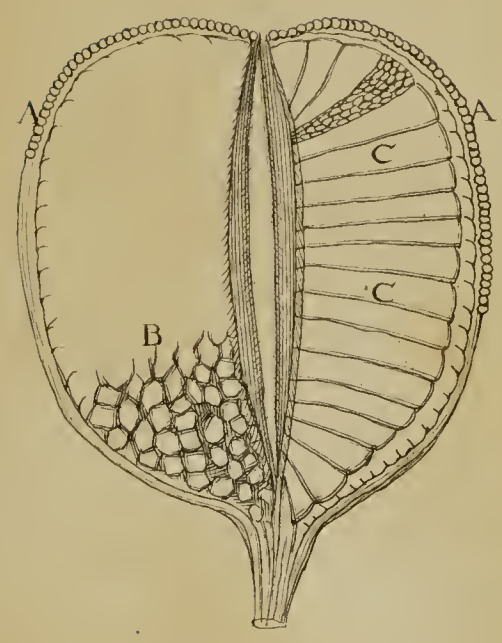

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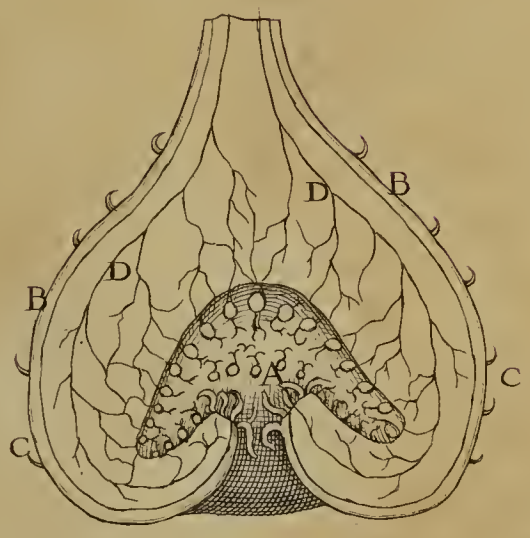

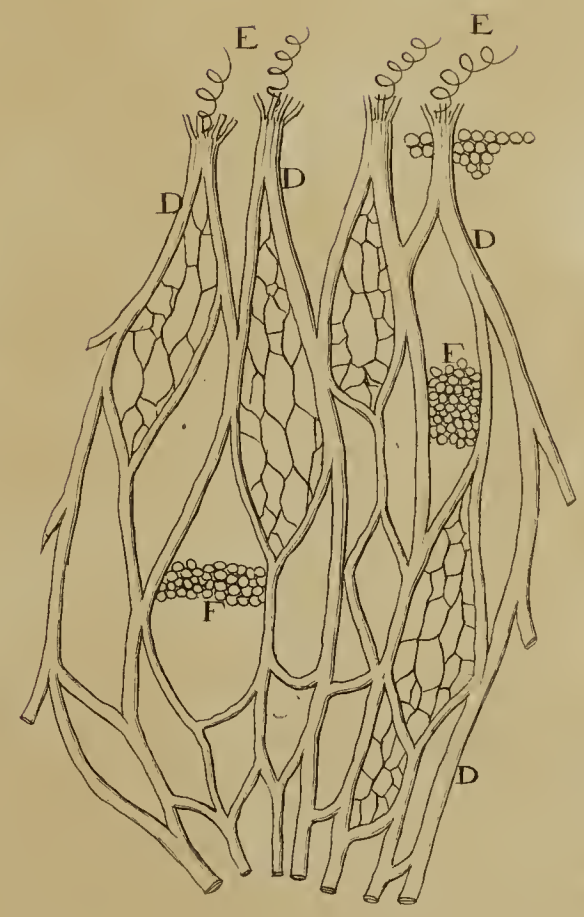

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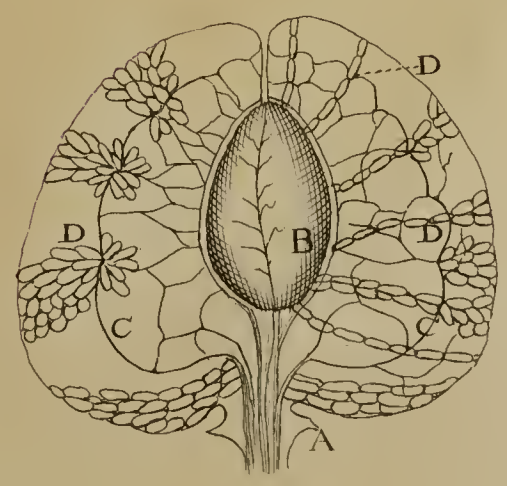

Tab. XLVIII.

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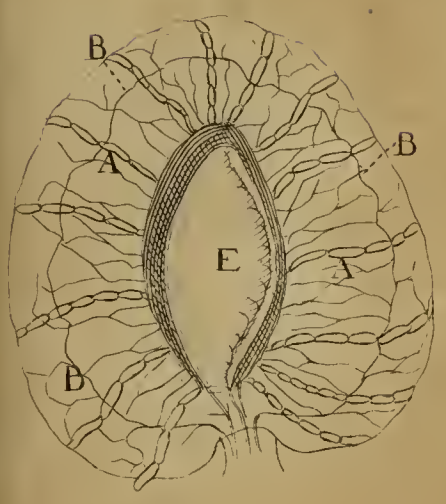

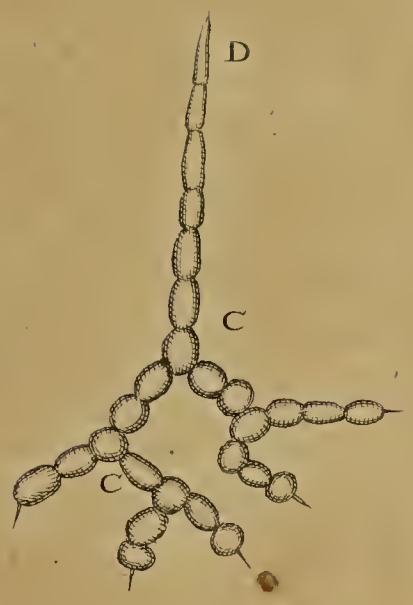

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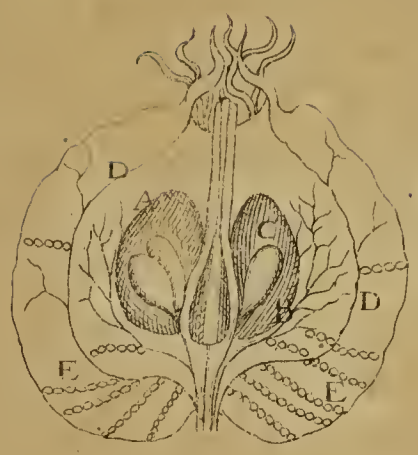

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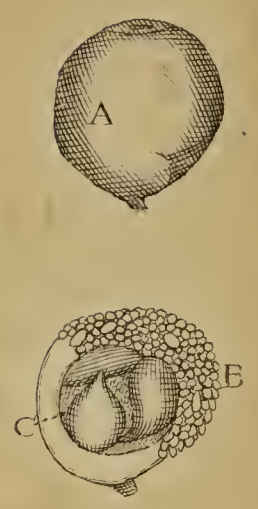

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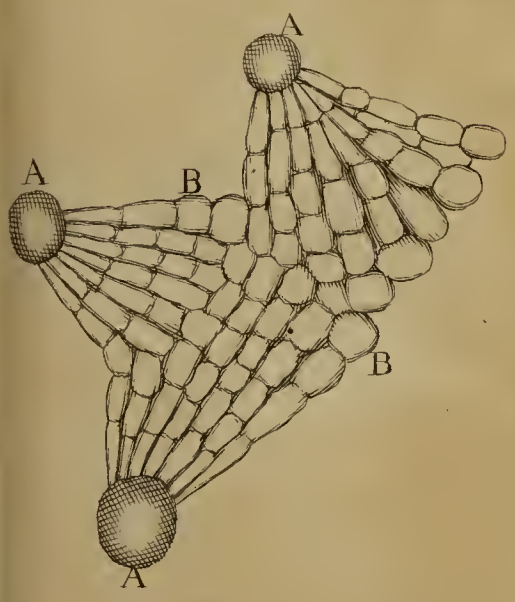

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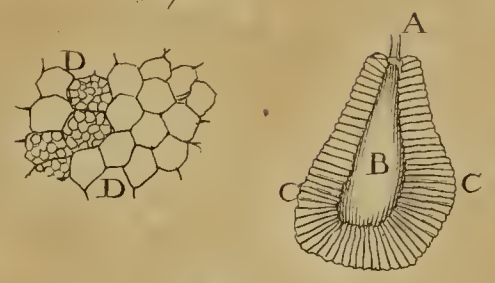

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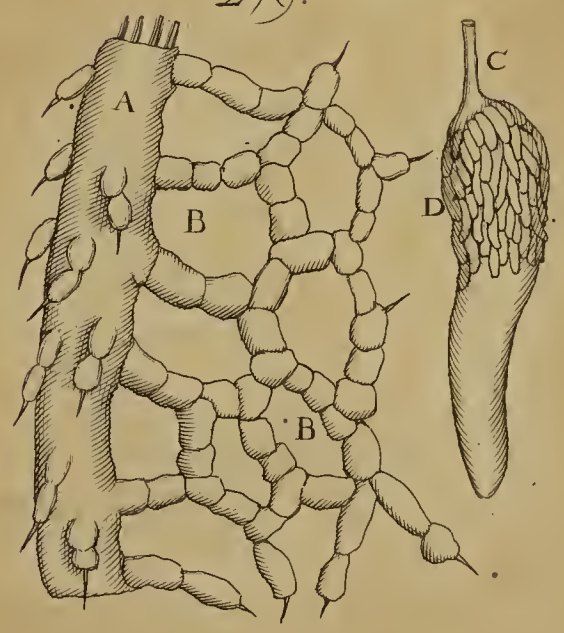

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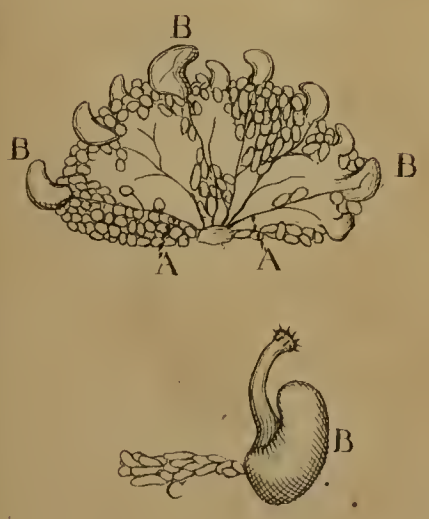
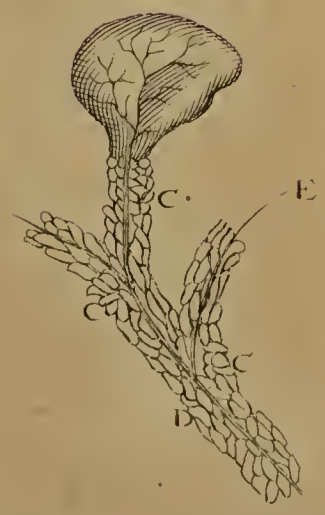
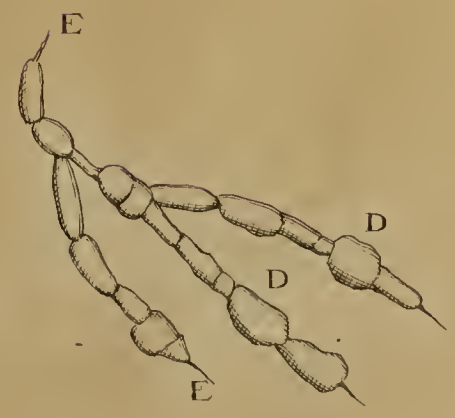






craſſum obducitur pericarpium, quo diverſę capſulę *B*, ſemina continentes, muniuntur. *Rutæ* quoquè 268 ſtylus adauctus, quadruplici obtuſâ attollitur appendice *A*, à qua totidem tubę partes *B* emergunt; exteriùs indumentum utriculis, oleo turgidis *C*, in concavitatibus repoſitis, ſcatet, & ſectus pendentia à ligneis fibris *D* ſemina *E* offert. *Mori* 269 quoquè multiplex uterus *A*, loco pericarpii affuſi circa oſſeum nucleum, quo ſemen cuſtoditur, quatuor foliola *B* habet, quę tractu temporis, turgentibus concocto & dulci ſucco utriculis craſſiora, redduntur, & in cibum cedunt. In *tithymalli chamæſyce* 270, Utero, qui peponis minimi ſpeciem refert, tot ſeparatę adſunt cellulę *A*, quę exteriùs & interiùs, intercipiente pericarpio reticulariter ducto *B*, ambiuntur. *Ariſtolochiæ longæ* Uterus 271, parem obtinet naturam; levi etenim pericarpio *A* exteriùs ambitur, & cellulæ eodem reticulari opere producto *B* firmantur, in quibus ſemina copioſa *C*, horizontaliter quaſi ſituata, aluntur. Tab. 47.

Hucuſque Naturam vidimus, pericarpium ſeminibus gracile texentem, & obducentem; modò fas eſt, ut Uteros, quibus copiosè elargita eſt, rimemur. In *ficu* 272 igitur noſtrate, per longum ſecto, & maturo, concavitas *A* occurrit; pericarpium etenim exteriùs membranulâ *B* obvelatur, à qua ſpinę recurvę *C* prodeunt; ſub hac conduntur ligneę fibrę, faſculi ſcil. *D*, reticulariter inoſculati. Unaquæq; fibra eſt fiſtularum congeries, cujus centrum trachea *E* occupat. Arearum ſpatia replentur utriculis *F*, quibus pericarpium excitatur; ab hoc portiones *G* emanant, utriculorum ſerie donatę, quę interiora versùs deductę, oſſeam ſeminis capſulam *H* exporrigunt. Parem configurationem in *peponibus* reliquiſq; ſimilibus, & *cucurbita* ipſa miramur: In his interiùs pendentia ſemina craſſo tutantur pericarpio. *Ceraſa* 273, & conſimilia amplo donantur pericarpio; ſecto namque ceraſorum utero, à pediculo *A* aſcendentes ligneę fibrę obſervantur, quę potiori parte versùs oſſeum nucleum *B* progrediuntur, reliquę *C* per medium pericarpii elongatę, invicemq; ramulis anaſtomoſatę, totam pericarpii regionem pervadunt. Fibroſis hujuſmodi faſciculis, ſuâ tracheâ ditatis, utriculorum appenduntur ſeries *D*, quę dulci ſcatent ſucco; hęq; in nucleum deſinunt. *Prunorum* par ſtructura 274 ſuccedit; horum pericarpium, utriculorum ſtiriis excitatum *A*, ligneis fiſtulis & tracheis *B* pervaditur. Licèt difficillimum ſit, ſenſu ipſo attingere pericarpii ſtructuram, attamen videtur ordinibus utriculorum componi, qui interdum formam *C* exhibent; versùs enim peripheriam fructus reticulariter implicari videntur, ſenſim tamen gracileſcendo appendice *D*, oſſeo nucleo *E* uniuntur. *Pomorum* ingens genus 275 pari conſtat formâ; ipſorum uterus *A* multiplex eſt, & gracili cartilagine, loco oſſei operculi, interiùs *B* munitur, ſemenq; *C* continet. Utero accreſcit copioſum pericarpium, ligneis fibris *D* irrigatum, à quibus utriculorum ordines *E* pendent. *Arum* 276 quoq; multiplici ſeminum congerie conſtat: Quicumq; tamen uterus, veluti pomum *A*, craſſiori excitato pericarpio *B*, tribus utplurimùm ſeminibus *C* cuſtodiam parat. Tab. 48.

Idem

Idem in *Moly montano* obſervatur. *Pirorum* 277 uterus conſimili inſignitur ſtructurâ; ſemina etenim pericarpio conduntur: Hoc tamen peculiare habet, ut utriculorum ordines, quibus ipſum componitur, non unam habeant inclinationem versùs centrum, ſed diſperſi paſſim lapilli *A*, tartareiq; globuli inæqualis figuræ obſerventnr, circa quos utriculorum ſeries *B*, veluti tot lineę circa centrum ducuntur. Frequenter in *piro* pediculus ligneis & ſpiralibus fiſtulis coagmentatus tartareas appendices *C*, & ſaxeos lapillos *D* à fibris *E* pendentes habet, & in eodem medullę loco tartarea luxuriat ſubſtantia. *Cydoniorum* caro iiſdem tartareis ſcatet lapillis, qui de more productis coſtulis fibroſis appenduntur, & circa ipſos utriculorum ſtatuuntur ordines. *Pomum granatum* 278 craſſiori pericarpio parùm exſiccato, in naturam ſolidioris involucri exteriùs munitur, quod *malicorium* dicitur; contenta verò concameratio cellulis diſtinguitur, quæ tenuibus membranis, *cici* nomine donatis, obvelantur. Hujuſmodi autem replentur ſeminibus, quę, pomorum inſtar, à fibroſo pediculo *A*, derivato à pericarpii cortice, pendent. Quodlibet itaque ſemen oſſeo nuclo *B*, centrum tenente, circumdatur; huic autèm hęrent innumeri penè utriculorum ſeu ſacculorum ordines *C*, quaſi radioſa corpora, quibus tota rubicunda caro, quę gratum expreſſa reddit ſuccum, componitur: Exteriùs membranâ cooperitur, quę angulares areas *D* deſignat. Conſimilem compoſitionem in *uva ſpina* reperies. Succedunt *limonia* & *aurantia poma* 279, quæ duplici conſtant pericarpio; exterior enim caro multiplicibus lignearum fibrarum faſciculis *A* irrigatur, à quibus hinc inde enaſcuntur utriculorum reticulares productiones *B*, peculiarem ſuccum continentes; unde ex horum multiplici congerie tota caro coagmentatur. In exteriori hujus ſuperficie ovales veſiculæ frequenter locantur, quibus oleoſa materia coercetur. Caro, exteriorem ambitum conſtituens, interiùs concamerationem excitat, quæ ab oblongis ſacculis, ſucco acido refertis, occupatur; hujuſmodi ſacculorum tumulus in tot diſparatis cellulis ſeu uteris continetur, unde appenſa ſemina fovent, & ambiunt. Quilibet ſacculus, ſuo pediculo *C* firmatus, à fibroſo faſciculo per carnem diſperſo pendet, & propriâ membranâ utriculorum innumeram ſeriem ambit, qui acido ſucco turgent: Horum forma *D* exteriùs oblonga eſt, interiùs amplior, angularis & varia.

In luſtratis hucuſque Uteris, Natura pericarpium exteriùs locavit, ipſoſq; circumvallavit; in aliquibus autem inversâ viâ à pericarpio, in globoſum corpus coagmentato, emergere voluit Uteros & contenta ſemina: Hoc in *fragis* 280 pręcipuè deprehendimus, quorum Uterus per longum ſectus ligneas fibras *A*, à petiolo aſſurgentes, exhibet; ab his pendent Uteri, ſeu ſeminum capſulæ *B*; fibroſis verò coſtulis hærent utriculorum ſtiriæ *C*, quæ dulci turgent ſucco; & harum progreſſus videtur tot ſacculis, ſeu utriculis *D*, componi, qui inæquali pollentes figurâ, & contento humore turgidæ, contentum fibrarum faſciculum *E* ambiunt; unde hujuſmodi ordines velut ramorum productiones diverſos gignunt quaſi ſurculos. In *cinara*, & *heliotropio* 281, cauliculi apex ſenſim dilata-

TAB. 49.

tur

tur, ut ſuperiùs delineavimus, ita ut area horizontalis & rotunda fiat; exteriùs enim fibrarum & trachearum productiones aſcendunt, reliquum verò intercepti ſpatii à pericarpio occupatur. Hujuſmodi utriculis candidis ſucco turgidis *A*, in rete productis, componitur, & ab hoc emergunt ſtyli, ſeu Uteri.

Non perpetuò pericarpii caro ſemini exteriùs affunditur in cuſtodiam, ſed quandoque, ut vidimus, interiùs locatur; hoc apprimè etiam eluceſcit in quibuſdam plantarum ſeminibus, & præcipuè in *rubia*, 282, cujus geminus utplurimùm pendet Uterus *A* ab uno petiolo *B*; exterùs cortice quaſi ſpinoſo *C* contegitur, levi inducto pericarpio, ſub quo album quoddam corpus *D*, rotundum, interiùs concavum, locatur; hoc itaq; non omnino continuum eſt, ſed in *E* ſolvitur; interiùs fovet ſemen, locumq; ſecundinæ habet; concavitas verò *F* pericarpio utriculis excitato repletur.

Mos eſt ulteriùs Naturæ, neglecto pericarpii augmento, oſſeum nucleum augere, quo ſemen tutatur: Ita quamplurimis accidit fructibus, præcipuè verò in *amygdalis* 283; ipſarum namque pericarpium *A* à principio mollius, non, ut reliquorum mos eſt, in majorem excreſcit molem, & tandem maturatur; ſed factâ comparatione gracilius redditum tandem contabeſcit, oſſeo relicto nucleo. Pericarpii ſtructura fibrarum reticulari opere *B* pervaditur, à quo utriculorum pariter ordines *C* pendent, versùs interiora, ea ſcilicet parte, quâ oſſeum nucleum *D* ambit, & contangit: Appendices habet *E*, quæ nuclei oſſei foramina *F* ſubintrant. In hoc pericarpio illud mirabile eſt, quod circa tracheas & ligneas fibras *G* ducuntur vaſa, ſeu ductus terebinthinæ; unde ſecta, copioſè fundunt hujuſmodi humorem. Pericarpii exterior ſuperficies cinereis pilis *H* tota cooperitur. Oſſeus nucleus horizontaliter hìc ſectus geminâ laminâ, interiori ſcilicet *I*, ſemini proximâ, & exteriori *K*, quæ pericarpio continua eſt, excitatur: Hæ à primordiis ſolideſcere incipiunt; ipſarum enim utriculi *L*, qui olim pericarpii naturam redolebant, concreſcente tartaro petrificati, in hanc deſinunt naturam. Interius appendices *M* promuntur, quibus invicem laminæ nectuntur. Ex præcipitato perpetuo tartaro coercita pericarpii portio neceſſariò concreſcit: Et quoniam inter utramq; laminam vaſorum faſciculi cum terebinthinæ ductu *N* excurrunt, ideò vacuitates *O* ſuperſunt, molles pericarpii utriculos *P* continentes, qui vaſorum faſciculis hærentes, poſtremò petrificati reliquorum naturam acquirunt. *Nucum* 284 compages conſimilis extat: Horum pericarpium viride, temporis tractu, quia pepaſmum non acquirit, gracileſcendo contabeſcit; dum autem vireſcit, à petiolo copioſas recipit fibras *A*, quæ ipſum pervadentes reticularibus implicationibus *B*, utriculorum ſeriebus *C* nectuntur: Hæ autem deſinunt in oſſeum nucleum *D*, quo ſemen cuſtoditur; ita ut pericarpii continuata portio cum nucleo marceſcat, & ita concidat. Ab eodem petiolo inſignes fibrarum & trachearum faſciculi *E*, non longè ab interiori pericarpii ſuperficie producuntur, qui frequenter nucleo hærent, in quo delineatæ productiones veluti

alveoli & vaginę excavantur. Oſſeus nucleus, pericarpio continuus, præcipitato tartaro, dureſcit; iiſdem enim utriculorum ſeriebus in centrum inclinatis componitur, qui tartarizati ferè obliterantur.

In quamplurimis plantis exiguum in utero extenditur pericarpium, ſub quo tamen oſſeus nucleus incluſum cuſtodit ſemen. Hoc paſſim in *ſpinaceorum* 285 genere obſervatur, in quo Uterus *A* gracili utriculoſo pericarpio tegitur, quod in gemina quaſi cornicula *B* attollitur; intus verò oſſeus nucleus cuſtoditur. Alia pariter ſpinacea aſperum habent uterum *C*, exiguis utriculis coopertum, inſignibus emergentibus tuberculis; in ſummitate autem minimæ contorquentur acuminatæ tubæ *D*.

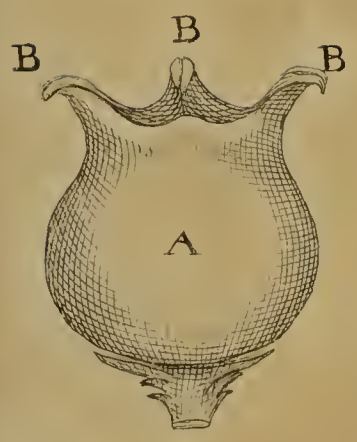
Hactenùs *pericarpia* ſcrutati ſumus, quibus Uteri in ſeminum cuſtodiam ditantur: In nonnullis tamen Uteris deſideratur pericarpium, ejuſq; loco ligneæ eruptiones adduntur. Ita in *caſtaneis* 286, adhuc tenellis, calyx obſervatur, in quo tres Styli ſeu Uteri includuntur. Interior ipſius concavitas pilis candidis mollibuſq; ornatur; exterior verò duplici appendicum genere contegitur; alia enim ſunt quaſi gracilia & oblonga folia *A*, per longum ſituata, reliqua verò veluti ſtyliformes proceſſus erumpunt, ita ut horum ſeries mediet alterum foliorum ordinem *A*. Tractu temporis echinata hæc capſula, craſſior reddita, fibrarum productionem *C* admittit, & ſolidato in utriculis ſucco, in oſſeam quaſi naturam degenerat. Interiores pili *D* adhuc ſuperſunt, & obliteratis exteriùs foliorum ordinibus, ſtyliformes proceſſus, geminatis, quaſi ramis *E* in acuminatas degenerant ſpinas, quibus calyx taliter conſtitutus contentos fructus ambit.

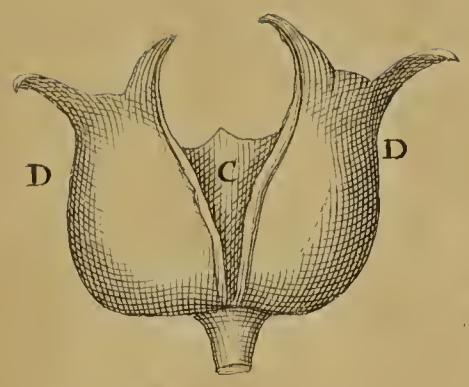
TAB. 50.

In quibuſdam Pericarpium vel Uteri ſubſtantia, à principio mollitiem ſortita, diuturnitate temporis lignea & ferè oſſea redditur: Ita in *cupreſſo* 287 copioſi pendent Uteri, nuces, coni, baccæ, & galbuli appellati, qui in tot ſtylos diviſi congeriem excitant; exteriùs etenim eminentiæ quædam *A*, plurium angulorum, ita ut ſeſe invicem contangant, quaſi ſtyli protuberant, in quibus interiùs ſeminum loculi excitantur; à pediculo namque ligneo *B*, copioſæ ligneæ fiſtulæ unà cum tracheis *C* diramantur hinc inde, quibus veluti pericarpium *D* affunditur. Inter utramq; pericarpii portionem *D* cellulæ excitantur, quibus ſemina *E* foventur; unde tractu temporis, maturato ſemine, exſiccato pericarpio, interpoſiti aperiuntur & laxantur hiatus, ut ſemina diſpergantur. Pericarpii moles talitèr configuratur: A lignea coſtula; quæ fibris rectis tranſverſalibus, utriculis, & tracheis conſtat, ligniq; ſoliditatem ſapit, lateraliter emergunt rami *F* jam delineati, in ſingulas baccæ partes producti: Multiplicibus namq; ſurculis *F* tota fulcitur moles: Circa ramos locantur fiſtularum argentearum ſeu ſacculorum ordines *H*, quibus reticulares utriculorum plexus, obſcurè deprehenſi, affundunduntur. In hoc itaq; ligneo pericarpio plures ductus & ſinus *I*, terebinthina turgidi, excitantur.

Jam

292.





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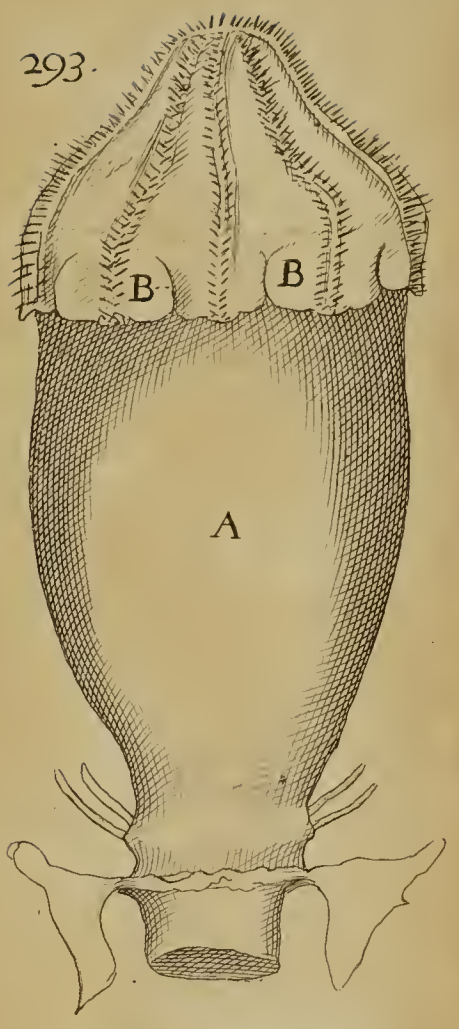

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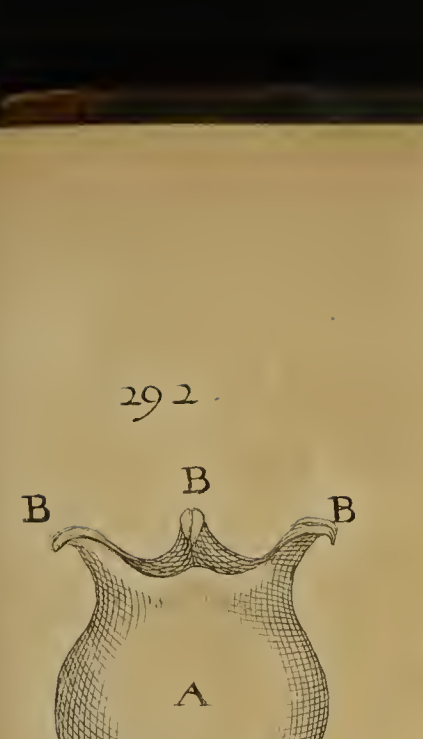

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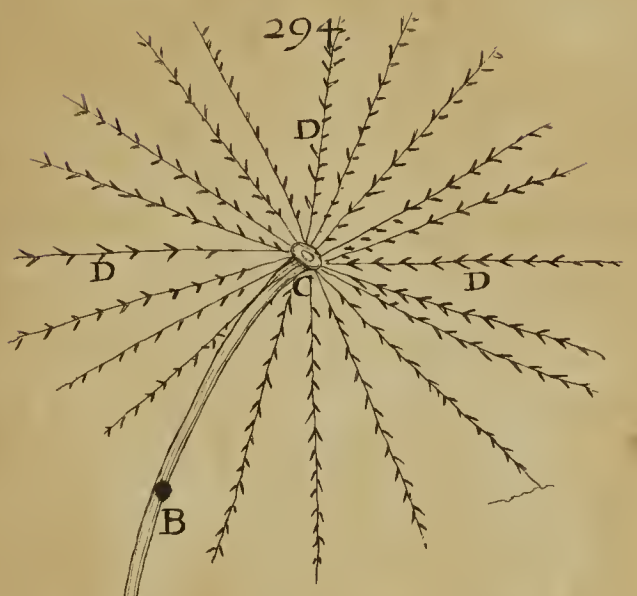

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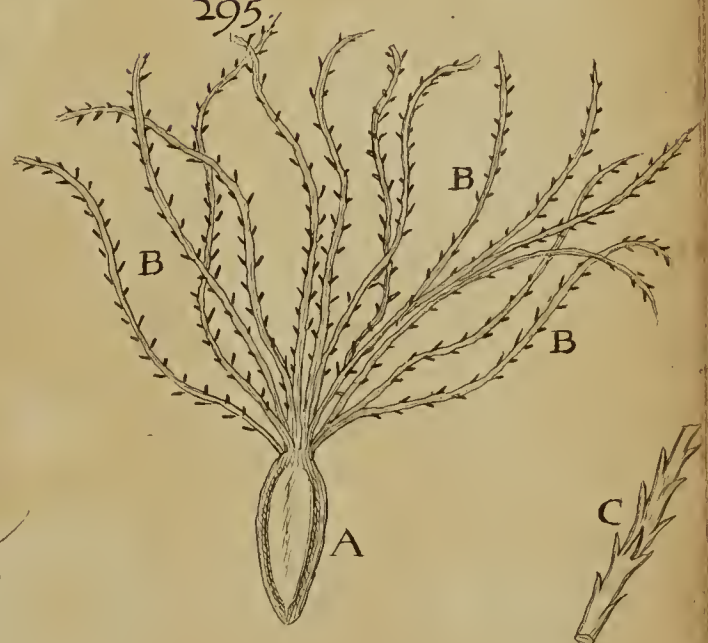

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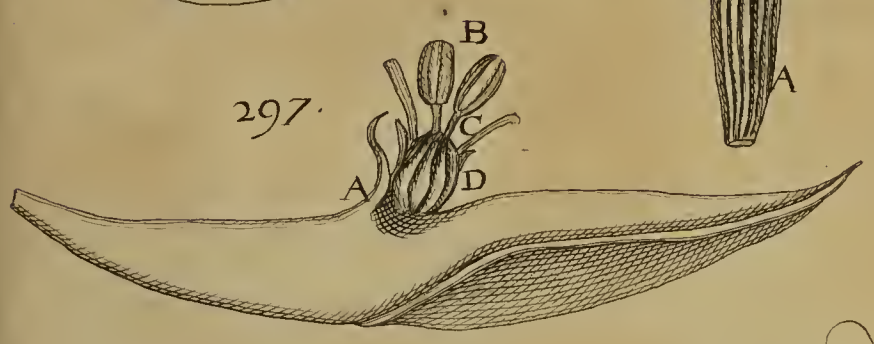

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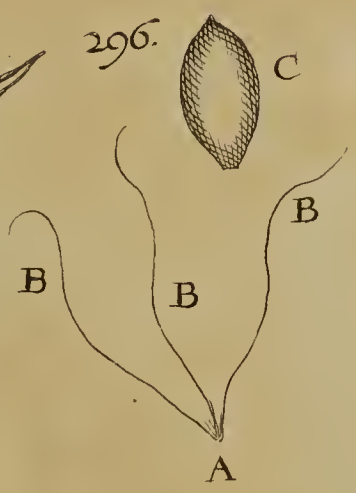

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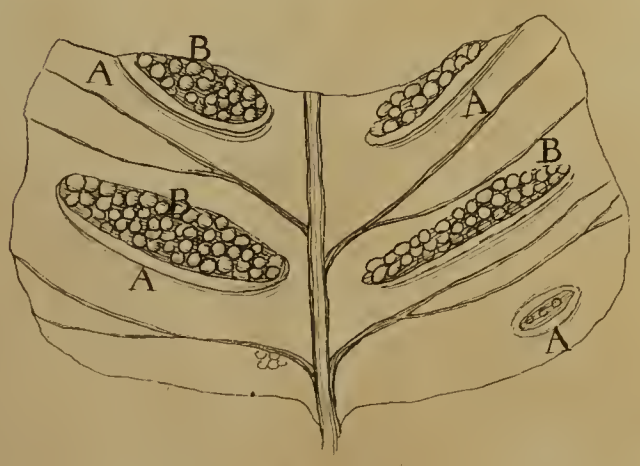

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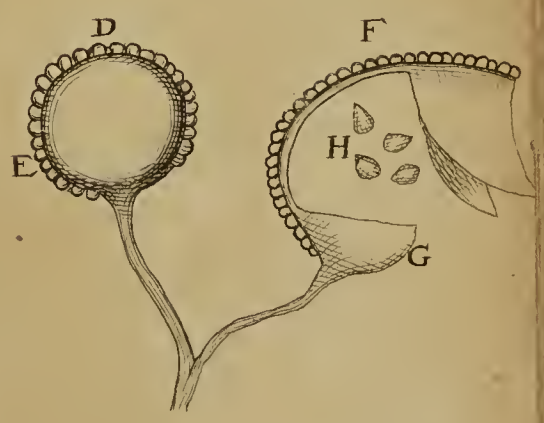

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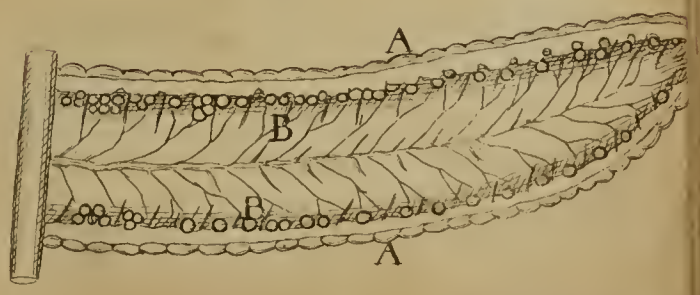

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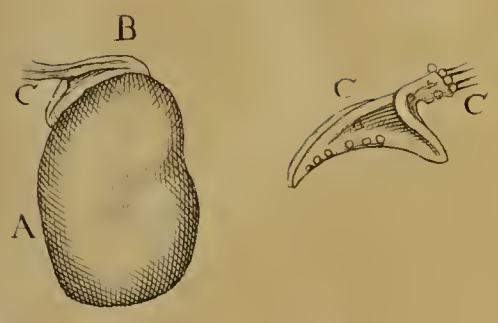

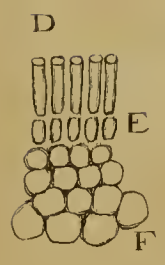

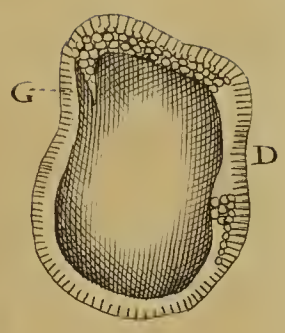

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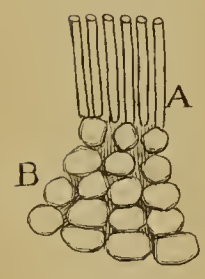

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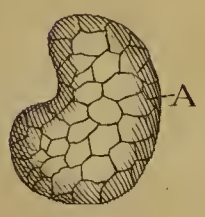

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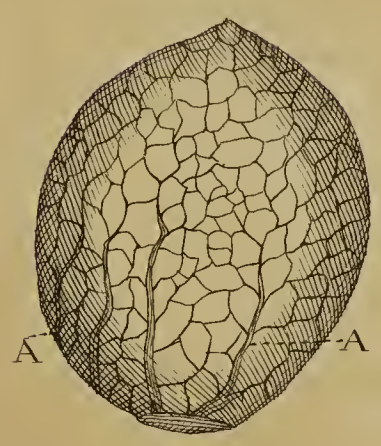

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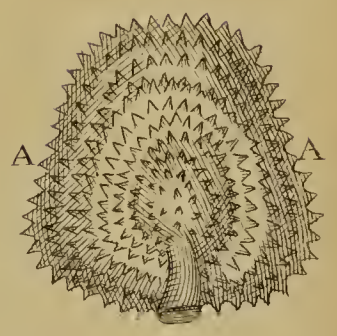

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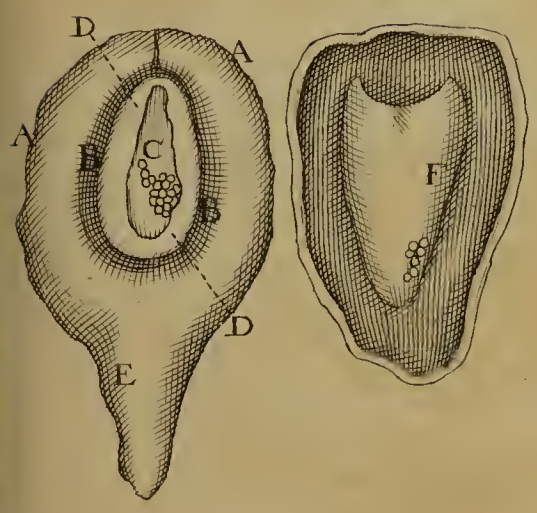

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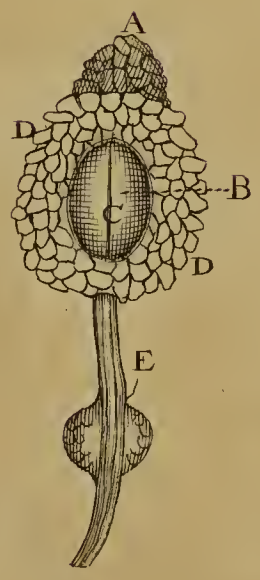

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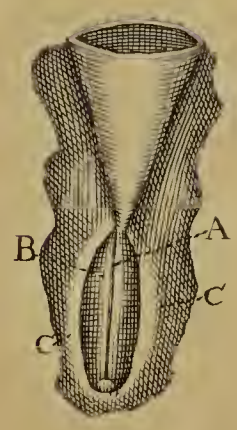

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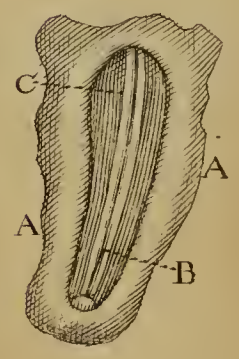

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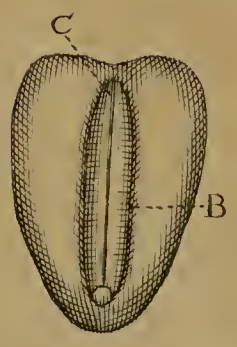

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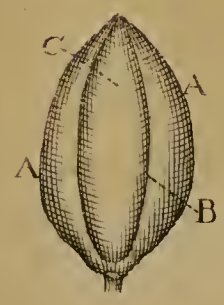

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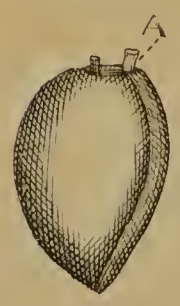


Jam *Uterorum compagem* rimati ſumus, quibus Natura pericarpium vel oſſeum integumentum elargita eſt: Modò fas eſt, ut plantarum *Uteros* indagemus, quos quidem copiosè conglomerat ſub ſpicarum, jubæ & ſimilium ſpeciebus; in quibus tamen ſinguli Uteri, pericarpio deſtituti, membraneis indumentis cooperiuntur, ſpiniſq; & ariſtis frequenter muniuntur. Primò itaq; ſimplex occunit *lolii* ſpica 288, cujus ſemina nullo ferè calyce cuſtodiuntur; ab extremo namq; caulis ſpica mutica excitatur, & primò fit quaſi nodus *A*, à quo folium *B* carinatum emergit, hocq; munitur ſemen *C*: Idem in reliquo calami accidit; cum hoc tamen, quod ſenſim multiplicantur ſemina, ut patet in ſubſequentibus nodis *D*: Solent circa apicem plura pendere ſemina *E*, racemi inſtar, ab uno fibroſo petiolo. Unumquodq; ſemen geminis tegitur involucris, quæ *gluma* appellantur. Huic ſuccedit *phalaridis* pratenſis Uterus 289, qui potioribus excitatur integumentis; in hoc ſpica quædam obſervatur elegans, à cujus petiolo alternatim hinc inde pendent peculiares loculi, ſemina cuſtodientes. Singula itaq; capſula, à pediculo *A* pendens, geminis quaſi foliolis *B* tenuibus, ſolidis tamen, concavis, & carinatis, excitatur; hæcq; unita quaſi folium æmulantur, & hinc inde à cauliculo pendentia, ſpicam, quaſi pini fructum gracilem & oblongum componunt. Exarata foliola ligneis fibris firmantur, quibus rotundi & ſolidi utriculi hærent. His diductis, ſemen ſecundinis circumdatum *C*, piliſq; coopertum, exeritur. *Milii* 290 pariter juba pluribus conſtat Uteris, qui oblongo pendent petiolo ab extremo cauliculo; ſingulus autem ſtylus primò in foliolum *A*, loco calycis, concavum promitur; huic gemina folia *B*, fibris contexta, adſtant, quorum ope concluſum ſemen *C* ambitur. *Tritici*, & *Avenæ* ſpica 291, multiplicium quoq; ſeminum conglomeratione conſtat; in ſingulo autem peculiari Utero, ſeu tuba, varia mirari licet. Nam primò petiolo *A*, gemina folia carinata, vel potiùs calycis capſulæ *B*, appendentur, ſolitis fibris, & utriculis excitatç: Superiùs binæ pariter exoriuntur concavæ portiones *C* pilis coopertæ, quæ in ariſtam, ſtyliformem ſcilicet appendicem *D*, deſinunt, quæ hinc inde erumpentibus ſpinis munitur. In qualibet harum concavitate, ſeu gluma, ſemen *E* fovetur, quod tenui etiam foliolo *F* cooperitur. Parùm abſimilem ſtructuram in *hordeo*, & quibuſdam gramineis ſpicis contemplari licet.

Nec ſat fuit Naturæ, ſeminibus integumenta paraſſe, ut matura diu foveantur, ſed & ipſorum libertati conſuluit, ſtatóq; tempore, laxato Utero, in lucem, quaſi orta, extra erumpere juſſit. In quibus igitur oſſei ſunt Uteri, geminæ ut plurimùm partes, quarum unione concavitas conſurgit, hiantes & ſeparatæ exitum ſeminibus concedunt. Ita in *nuce*, *malis Perſicis*, *ceraſis*, & ſim. contingit. Hoc ita latè patet, ut noſtrâ non egeat deſcriptione. Elegans eſt *buxi* 292 partus; hic rotundo conſtat corpore *A*, tribus emergentibus tubis *B*: In partu autem arefactis jam utriculorum ſeriebus, quibus leviter cooperitur, laxantur articulationes, & hiatus aperitur *C*, ita ut à pediculo per longum diducantur hinc inde TAB. 51.

geminæ

geminæ tubarum partes *D*, & contenta in tribus diſparatis cellulis ſemina excidant. In *papavere* 293, miro artificio Natura ſeminibus exitum paravit. Ipſius Uterus *A*, cellulis coagmentatus, tractu temporis cartilagineus redditur; tubæ autem *B*, à primordiis deorſum pendulæ, ſenſim exſiccatione convulſæ *C*, ſurſum attolluntur, & portiones loculorum *D*, quaſi feneſtrarum opercula, deorſum retrahuntur; ita ut in ſingulis cellulis foramen *E* aperiatur minimis & incluſis ſeminibus.

Non tantùm ſeminibus exitum ab Utero paravit Natura, ſed, ut faciliùs in longum & diſtans diſpergerentur, Uteris additamenta paravit: Hæc *pappi* appellantur; ita paſſim ludit Natura in *taraſco*, & reliquis *cichoreaceis*, 294: Fit enim Uterorum congeries, unde maturato ſemine ſingula decidunt, ventoq; rapiuntur. Conſtant loculo *A*, ſemen cuſtodiente, quod exteriùs ſtriatum eſt, & ſpinoſas appendices promit: Ab hoc elongatur haſtula *B*, quæ capitulo *C* terminatur, à quo, veluti à communi centro, radiorum inſtar, graciles pili *D* erumpunt, qui hinc inde quaſi ſpinas promere videntur. In *ſoncho* 295, Uterus compreſſa quædam capſula *A* eſt, quâ ſemen conditur; ab hujus ſummitate pili *B* enaſcuntur, quorum lateribus appendices *C*, ſpinarum inſtar, hærent. In *cinara* & pleriſq; ſimilibus, pappos ſeu lanuginoſos villos circa ſemina luxuriare videmus; & in *populo* 296, hujuſmodi pili, ab uno exorti, quaſi nodo *A*, in tres veluti ramos *B* diſtinguuntur, quibus ſemen *C* cuſtoditur, & dum vento rapitur, diſpergitur.

Hucuſq; loculos, ſeu *Uteros*, quibus ſeminales plantulæ foventur, à floris umbilico, vel ejus analogo ſitu, pendere vidimus: Solet autem Natura in quibuſdam plantis ab iiſdem foliis Uteros promere, hoſq; copioſos; hujuſmodi miramur in *bilingua* 297, in qua versùs medium folii frequenter in ſuperiori parte, & interdum in oppoſita, à coſtula majori emergit uterus: Nam primò folium *A* acuminatum loco calycis aſſurgit; non longè ab hoc eminent gemini Uteri *B*, ſeu cellulati ſtyli, ſemina continentes, petiolis *C* ſuffulti; in baſi verò congeries foliorum, florem integrantium *D*, luxuriat. In *phyllitide* 298, majori utitur munificentiâ Natura; nam ab inferiori foliorum parte, diſruptâ cuticulâ, ingens hiatus *A* in ſingulis amplioribus areis aperitur, ita ut copioſa erumpant ſemina *B*. Quid ſimile in *ſcolopendrio*, & *polypodio* 299, molitur Natura; in hujus exteriori foliorum ſuperficie *A*, globulorum racemi *B* hinc inde ab excurrente coſtula *C* pendent: Hi primò virides ſunt, tandem æruginoſi; racematim pediculis mediis ab interiori ſubſtantia pendent. Primò etenim tumor inter utramq; folii cuticulam eminet, & diductâ epidermide globuli erumpunt, quorum ſtructura mirabilis eſt; tenui namq; membranâ conſtant, & exteriùs ab annulo *D*, circulum in totum non explente, ambiuntur: Hujuſmodi quaſi tot globulis *E* conſtat, unde Uterus aperitur, dum prædictus ſemicirculus *F*, velut arcus, ad lineam rectam reducitur; diſruptâ membranâ *G*, in diſtans effunduntur ſemina *H*, lutei interdum coloris. Parum abſimilem ſtructuram obſervamus in *filice* 300, cujus quælibet folia in exteriori ungue

A, versus interiora reflexo, semina *B* copiosa custodiunt, & alunt: Nam elongatis utrisq; membranis cutaneis *C* folii, fit quasi nidus seminum, quæ cum *polypodio* omnimodam sortiuntur compagem, pariq; ritu, laxato arcu, loculi aperiuntur, seminaq; effunduntur.

Lustratæ hucusq; structuræ probabiliter evincunt, in herbis & arboribus stylum in molem ita excrescere, ut Uteri munia suppleat; & sicut in *viviparis* Uterus geminatur binis productis tubis, ita in *plantis* incertâ lege multiplicantur tubæ, quarum appendices adhuc hiantes in aliquibus conservantur: Quare tot loculi, vel siliquę, superiùs examinatæ, probabiliter Uterorum, vel satius Tubarum, munus explebunt. Idem probabiliter philosophandum venit de *spicis*, *jubis*, & similibus, in quibus membranosi utriculi, licèt semen non undequaq; ambiant, contentum tamen fœtum fovent, & tutantur frequenter spinis & aristis. Uterum igitur Plantarum & Vegetantium, in aliquibus, solo membraneo graciliq; corpore concavo & tubuloso, vesiculæ instar, excitari videmus; huncq; ligneis fibris, tracheis & utriculis irrigatum deprehendimus: In hujus centro semina vel fœtus gignuntur, & adolescunt. In aliis Vegetantium ordinibus, ut in *siliquaceis*, crassiori redditâ interdum ambiente Uteri & Tubarum substantiâ, quasi pericarpio, donari videtur; & in quibusdam oblongæ quędam appendices adduntur, quæ semina stipant & fovent. Crassius pariter obducitur pericarpium, elongatis fibrarum & trachearum fasciculis, à quibus utriculi succo turgidi pendent, & conglobatis hujusmodi stiriis in commune corpus, quod *fructus* dicitur, fit Uteri substantia, non dispari ritu ac in Fœminis accidit, quarum Uteri substantia contento sanguine ita tumet, ut solitam crassitiem triplo excedat. In aliquibus pericarpii hæc moles, turgidi Uteri vices supplens, ambiente interiùs corpore obuelatur, quod plerumq; cartilagineum est, ut *pomis*, *pirisq;* accidit; in aliis autem osseam substantiam sortitur, hujusq; structura in tenellis adhuc, è pericarpio in uteri cavitatem cribratum extillat humorem. In nonnullis dilatato, sub horizontali plano, pericarpio, inter florum vestigia peculiares foventur tubæ, seu styli. Et quoniam pericarpii hæc moles evidenter eadem est cum transversalibus utriculis caulis, vel caudicis, fistulis & tracheis, (ut in *cinara* evidenter patet,) ideò in reliquis pericarpiis idem philosophandum est; quod in *cucurbita* apprime apparet, in qua sensim elongatæ utriculorum transversales series, in petiolo dilatationem promovent; & ita longiores redditæ & circumductæ, cucurbitę pericarpium excitant, & reticulariter utriculorum productionibus, seminum secundinas, ad quas derivantur, humectando fovent.

Affusum itaq; pericarpium pluribus Uteris concoctum fortasse succum contento fœtui subministrat, vel saltem externi caloris vim obtundit, ne solaribus radiis contabescat. In quibusdam autem pericarpium interiùs locatur; unde petiolo communicatus humor semen fovet & alit. Quoniam tamen plures exarati Uteri pericarpio vel ejus analogo destituun-

tur; ideò fas est credere, succum, qui à pericarpio percolatur in semen, non omninò productioni ejusdem conducere; sed materiam à fibris, derivatis immediatè à petiolo, & secundinis excerni, pericarpii verò succum tutari potiùs, quàm componere.

Allata insuper sufficienter evincunt, pericarpii succum, suis utriculis turgentem, maturum reddi, non ita exigente peculiarem finem Naturâ, sed ex transpiratu, & externorum actione talem fieri statum, qui per accidens hominibus in aliquibus gratus succedit; cùm plurium pericarpium immaturum corrumpatur, vel quasi osseum, vel ligneum reddatur. Nam ubi in pericarpii utriculis aqueus halituosusq; abundat humor, ungente aeris calore, hujusmodi facilè digeritur; unde utriculorum tunicæ, solæq; ligneæ fibræ supersunt; in aliis autem utriculorum succus contentis salibus ita acidus redditur, ut vigente sole commixtæ fixentur particulæ in naturam cartilagineam, & non rarò osseam: Frequentius tamen pericarpii caro multo vitriolo scatet; unde ingens austeritas & aciditas præsentitur; temporis tamen tractu, fermentatione mediâ exaltatis & digestis succis, novus substantiæ modus & sapor emergit, qui dum nostro occurrens palato gratam excitat titillationem, & ingestus facilè evincitur, coctionem seu maturationem adeptus dicitur; cùm tamen successivi status, qui à primordiis usq; ad interitum in pericarpii humoribus contingunt, solius fermentationis necessariis motibus debeantur, & Natura his diversimodè etiam affectis debitam seminali plantulæ custodiam paret.

De

De Secundinis, & contento Plantarum fœtu.

TAnta *Uterorum* copia, quam hucuſque contemplati ſumus, ſingulis annis in tenellis ſurculis luxuriat, ut copioſa ſemina in lucem prodeant. Hæc, veluti novi fœtus, ſuis involvuntur *ſecundinis*, quarum ope diu cuſtodiuntur, & terræ concredita pro germinatione juvantur. Varia ſunt hæc fœtuum, ſeu ſeminalis plantulæ, integumenta. Et primò dubitandum venit, an oſſeæ capſulæ, ſeu nuclei, quibus in *ceraſis*, *malis Perſicis*, & *meſpilis* ſemen cuſtoditur, rationem habeant ſecundinæ, veráq; plantulę involucra recenſenda ſint; an potiùs ſint loco tubarum, vel Uteri, quibus fœtus poſtremò gignitur, & fovetur. Quoniam tamen in *piris*, *pomis* & ſimilibus, ſub pericarpio cartilagineæ laminæ, diverſos utriculos conſtituentes, locantur in centro, & à fibroſo corpore aſſurgentes appendicibus cum florum baſi continuantur, unde tubarum naturam ſapere videntur; idem igitur de *oſſeis nucleis* dicendum videtur: Nam licèt craſſioribus conſtent parietibus, pericarpio tamen continuantur, & per ipſos humor fortaſſe in contentum ſemen percolatur. Secundinæ itaq; propriè erunt, quæ hiante Utero unà cum ſemine excidunt. *Exterior* ſecundina ſeu involucrum variam nanciſcitur naturam; quandoq; oſſeam ferè ſortitur ſubſtantiam; interdum cartilagineam, & non rarò molliorem; pluribus item mechanicis integratur, quorum artificia mirari licet. In *fabis* 301, exterior configuratio eſt *A*, ambiente ſecundinâ excitata; in ſuperiori parte eminet appendix *B*, quæ pediculi rationem habet; hac ſuſpenditur ſemen, & in ſecundinam fibroſæ fiſtulæ derivantur: Conſtat igitur pediculus fibroſis faſciculis *C* variè circumductis, quibus hinc inde utriculi pendent. Exterior ſecundina innumeris penè conglobatur fiſtulis horizontaliter locatis, ita ut extima ſuperficies hiantia ora *D* exhibeat: Ipſarum progreſſus interiora versùs in utriculos & ſacculos *E* deſinit. Subſequuntur alii ſacculorum multiplices ordines *F*, quibus mollius involucrum excitatur, & in his receptus per fiſtulas humor tandem fœtui communicatur. Concavum eſt hujuſmodi involucrum, & contenti ſeminis formæ adaptatur, unde vaginam habet interiùs *G*, quâ ſeminalis plantulæ conus conditur. Maturato ſemine detumeſcunt hujuſmodi utriculi, ita ut ferè obliterentur; patent autem vireſcente ſemine, vel turgente vegetationis tempore contento ſucco. TAB. 52.

Eadem ferè configuratio occurrit in *piſis*, & *lupinis* 302, quorum ſecundina exterior ſolitis fiſtulis *A* componitur, horizontaliter ductis, quibus multiplices ſubſtant ordines utriculorum *B*, vario ſitu & figurâ conſtantes, hiſq; contento ſemini cellula paratur. *Papaveris albi* 303 ſecundina, cujus exterior forma minima faſeolum æmulatur, membraneâ

braneâ ferè excitatur ſubſtantiâ, cujus exteriorem ambitum reticulare vaſorum opus *A* cooperit, & diverſorum angulorum areę excitantur. *Cucurbitæ* pariter ſemen exteriùs minimum vaſorum reticulare opus exhibet, ſub quo plures utriculorum ordines jacent, & ſeminalis ipſa plantula ſubviridi iterum circumdatur ſecundinâ, turgidis congeſtâ ſacculis. *Amygdalarum* quoq; ſemen 304, ultrà nucleum oſſeum ſecundinâ circumdatur, quæ exteriùs utriculos cæcales *A* promit, interiùs verò per longum fibris ligneis, reticulariter implicitis, pervaditur, quibus utriculorum ordines appenduntur.

In *Cannabe* 305, ſemen ſecundinis pariter involvitur, quæ tenui epidermide cooperiuntur, ſub qua fibroſi faſciculi *A*, mirè impliciti, totam peripheriam excurrunt; areæ verò ſpatia utriculis replentur: Sub his horizontaliter locantur multiplices fiſtulæ, quibus involucrum ferè oſſeum excitatur, interiùs verò mollis ſecundina, utriculis compaginata, locatur, ſeminalem plantulam cuſtodiens.

In *Portulaca*, *Hyacintho Mattioli*, & *Gittagine* 306, ſecundina exteriùs pluribus exaſperatur eminentiis papillaribus *A*, quæ, quaſi ſpinæ, ſeu ſiphones, exteriora tutantur.

In *Cydoniis malis*, circa ſecundinas craſſum & mucoſum obducitur corpus, quod quaſi terebinthina nectitur, & aquâ ſolvitur, unde mucilagines eliciuntur.

Aliud inſuper mirari licet in Secundinarum indagine; nam in plæriſque, ut in *piro* & *pomo*, hiatus aperitur arctiori in cacumine, ubi ſcilicet plantulę conus latitat; in aliis verò feneſtra occurrit patenti cum hiatu: Hęc manifeſtatur primò in *faſeolis* 307; nam à latere feneſtra quaſi in nigro ſcuto aperitur; extrà enim eminet, aggeris inſtar, ovalis ſubſtantia *A*, cui ſuccedit, quaſi fovea, concavitas quædam *B*, tumorem ambiens, in quo hians feneſtra *C* ita patet geminis diductis labiis *D*, ut ſubjecti utriculi inanes emèrgant, qui inſerto olim petiolo continuabantur. Ab exteriori ambiente ſubſtantiâ elongatur appendix ſtyliformis *E*, ſub qua conditus plantulę conus excurrit, cujus extremitas interiùs utriculis, ſub feneſtra locatis *F*, veluti vagina cuſtoditur. In *Ciceribus* 308 eadem aperitur feneſtella: Acuminata eminet portio *A*, plantulę conicam radicem cuſtodiens, inferiùs ovalis concavitas *B* obſervatur, in cujus medio ſciſſura veluti recta linea *C* aperitur; exterior ambiens portio *D*, aggeris inſtar, eminet utriculis excitata, à qua pendet elongata fibroſa appendix *E*. In *Cicercula* 309 eadem feneſtra patet, oblongâ excitatâ ſciſſurâ *A*, quæ gemino quaſi labio parallelo *B* ambitur. Concavitas, de more, ovali aggere *C* circumdatur; huic continuatur vagina *D*, plantulę conum cuſtodiens. In *lupinis*, *lente* & *vicia* idem patet hiatus 310; oblonga namq; protuberans ſubſtantia *A*, foveam ambit, cujus longitudinem ſciſſura *B* pervadit, hinc inde emergentibus parallelis labiis *C*. In *Fabis* 311, ubi petiolus *A* ſemini nectitur, in ſecundinis exteriùs concavitas *B* excavatur, cujus longitudinem ſciſſura *C*,

altè

altè penetrans, excurrit; unde externus humor ſubjectis utriculis, & inde condito plantulę ſeminalis cono, communicari poteſt. In *Milio* 312, & conſimilibus leguminibus, ſemen exteriùs oſſeo ſublutei coloris involucro *A* cuſtoditur, quod intrò reflexum in *B*, quaſi umbo, tergum cooperit; reliquum tegitur conſimili concavo involucro *C*. Subſtantia ſecundinę fibras admittit per longum ductas: Sub hac, altera ſuccedit ambiens ſubſtantia friabilis valdè. *Milii ſolis* 313 exterius involucrum candidum, & quaſi vitreum, ex toto ſemen ambit, in ſitu verò avulſi petioli oſſeum quaſi fiſtulę fragmentum *A* eminet perforatum, quo ad interiora patet aditus.

Intra ſecundinas *fœtus*, ſive ſui generis plantula, cuſtoditur, & fovetur, cujus elegans minuſq; obſcura emergit ſpecies in *beta*, *atriplice*, & *ſpinaceis*, in quibus 314 depreſſum involucrum *A* fœtum cuſtodit; plantula *B* oblongâ pollet radice, ſuperiùs autem attolluntur gemina folia *C*, craſſa, parumque ab invicem diſtantia. In *Gittagine* 315, concluſa plantula *A* inſignis eſt, & debitâ conſtat radice, oblongis luxuriantibus foliis *C*, & circa incluſum pericarpium cubat. Idem penè mirari licet in *opuntiæ* ſemine 316, cujus fœtus oſſeo nucleo *A* cuſtoditur, & geminis conſtat foliis *B*, & erumpente radice *C*. In *calendula*, *colutea*, *melilotto*, *cytiſo*, *ruta*, *cannabe*, & *trifolio cochleato* 317, plantula occurrit; brevis etenim radix *A* interdum curvata obſervatur, ſupra quam gemina folia *B* lata, & craſſa, frequenter viridia aſſurgunt. In *veſicaria* 318, plantulę pariter ſpecies eluceſcit; nam intra ſecundinas *A* eleganti implicatione coercetur ſeminalis plantula, radice *B* & geminis oblongis munita foliis *C*. Idem miramur in *raphano* 319, cujus fœtus ſecundinis incluſus talem exhibet ſpeciem *A*; explicitis tamen foliis *B*, latis, ſpecioſę plantulę forma occurrit, in cujus foliolis fibroſę coſtulę *C* eminent. In *opio* 320, plantula intra ſecundinas complicata locatur; explicita tamen, oblonga viridiaq; patefacit folia *A*, caudici & radici *B* appenſa. *Pomorum*, *pirorum*, *ferulæ*, *perfoliatæ*, *farfaræ*, *malvæ*, *amygdalæ*, & *ceraſorum* 321 plantula, obſcuriori licèt formâ polleat, brevi tamen radicis trunco *A* munitur, & gemina craſſa amplaque patent folia *B*. In plæriſque leguminibus, & præcipuè in *fabis*, *lupinis*, & *piſis*, aliquantulum latet plantulæ forma 322, gemina etenim, craſſa & gibboſa folia *A*, trunco & continuatæ radici *B* appenduntur. Obſcurior pariter plantulæ forma in *lauro* 323 obſervatur; nam conglobata bina folia *A* minimum truncum & radicem intra ſe condunt. TAB. 53.

In *tritico*, & *avenaceis* videtur plantula unico, hocque obſcuro, folio prædita. Huic meditationi lucem tulit ſeminum *pomi armeniaci* frequens inſpectio; ſemel enim incidi in ſeminalem plantulam folio deſtitutam, & hujus gemma cum radice non parum luxuriabat; aderat

autem intra eundem nucleum alterum ſemen, ſeu plantula, in cujus auctionem primò conſpiraverat Natura: Ex hoc itaque monſtro interdùm credidi, frumenti & conſimilium ſeminales plantulas unico pollere folio, cui hæret gemma cum cauliculi inchoamento, & radici-
TAB. 54. bus. In *avena* 324, præcipuum corpus, ſeu ſeminis caro, in ovale & oblongum configuratur corpus *A*, quod in ſui medio excurrentem exhibet foveam; nam eſt veluti craſſa lamina, ſuis extremis in medium reflexis, & convolutis, cujus ſummitati plantula *B* appenditur, ſeu inſeritur, quæ radice *C* conſtat, quibus additur gemma, ſeu futurus culmus *D*; loco autem deficientis folii Natura fortaſſe radici involucrum *E* addidit. Idem miramur in *tritico* 325, cujus pericarpium gibbum *A* in auctiori apice plantulam ſervat; hæc erumpente gemmâ & radicibus *B* compaginatur, huicq; elegans obducitur involucrum *C*, quod poſteriorem parietis partem ambit; aſſurgit autem ſub ſpecie gemmę incluſus calamus ſeu culmus *D*, foliolis viridibus excitatus; unde plantula farinaceo deſtituta folio, ablatoq; involucro, formas *E* exhibet, in quibus gemma ſeu futurus culmus *D*, tres pariter appendices *F*, radicum ſcilicet inchoamenta, & cicatrix *G* avulſi folii *C*, occurrunt. In aliquibus ſeminibus plantula hæc hujuſmodi foliorum apparatu caret; ita in *cæpis ſativis*, *moly montano*, *tulipa*, *aſparago*, *lilio*, *aro*, & *gladiolo* 326 accidit, cujus plantula *A* cylindri inſtar efformatur, capitulo *B* interdum parùm turgente; hæc ſecta, quaſi tot involucris, loco gemmæ ſeu foliorum, coagmentari videtur. Circa plantulam, pericarpium *C*, utriculorum ſeriebus in ipſam directis luxuriat.

In *pino* 327, largiori munificentiâ procedit Natura; detracto namq; ligneo oſſeoq; involucro, & ſecundinis, obvia fit caro, quæ colorem ſubluteum refert, ejuſq; figura eſt *A*: Hujus ſubſtantia ſubdulcis, & rotundis utriculis conſtans interius concava & tubuloſa eſt, plantulamq; ſeminalem eximiæ ſpeciei continet: Hæc brevi conicâq; radice *B* anguſtiorem carnei involucri partem *C* occupat; verſùs medium oblonga promit foliola duodecim gracilia *D*, quæ geminante plantulâ diducuntur: Folia hæc tribus conſtant angulis; gemini extrà ſituantur, tertius verò interiora versùs, & ita faciliùs invicem adaptantur. In centro foliorum minima aſſurgit gemma *E*.

PLantarum ſeminalium exteriorem formam indagine proſequuti ſumus, prout nobis verę plantulę ſpecies exhibetur, in aliquibus evidentior, in aliis obſcurior: Ut autem ſingula pateant, iterum rimanda venit ipſarum peculiaris ſtructura. Inter cætera, quibus plantula integratur, præcipua ſunt *folia*, geminæ ſcilicet partes, quibus ſeminis caro excitatur; hæc utriculorum ſerie multiplici donantur, ut patet præcipuè in *faba* 328, cujus alterum folium *A* in interiori ſuperficie *B* utriculos *C* taliter inclinatos exhibet; exteriùs verò vago ordine *D* ſituantur.

tur. Hujuſmodi folia præter utriculos, ſucco refertos, fibrarum faſciculos intus cuſtodiunt, qui à plantulæ radice producti (ut mos eſt) foliorum longitudinem excurrunt; unde in tenellis ſeminibus ſpiralis tracheæ zona ſolvitur. Patent autem hujuſmodi faſciculi cum trachea, in ſemine *cucurbitæ* 329, & quinque numerantur inſigniores rami *A*, à quorum lateribus reticulares plexus emanant; unde fit, de more, mutua anaſtomoſis; ſinguli in cauliculum & continuatam radicem *B* deſinunt. Tenui obvelantur folia hæc membranulâ, ut plurimùm lucidâ, quæ in reliquis præcipuè leguminibus obſervatur. Perſimilis ſtructura in *cataputiæ* 330 ſemine reperitur. Hujus plantula ſecundina *A*, & carneis utriculis *B* circundatur, geminiſq; conſtat foliis, à quibus coſtularum progreſſus *C* eminent, & intùs tracheæ conduntur: Gemina hæc folia cauliculo & radici *D* appenduntur. Exarata folia, trunci principio & continuatæ radici hærent, quod patet in *faba*, *faſeolis*, & *cicerculâ* 331, in qua, inter gemmam *A* & radicem *B*, brachia ſeu pediculi *C* exporriguntur, ſubrotundi, brevéſque, & ſubingreſſi vel laxati in folium *D*, obliterantur. Conſtant fibrarum faſciculo, velut accidit reliquis foliorum petiolis, à quo utriculorum ordines pendent.

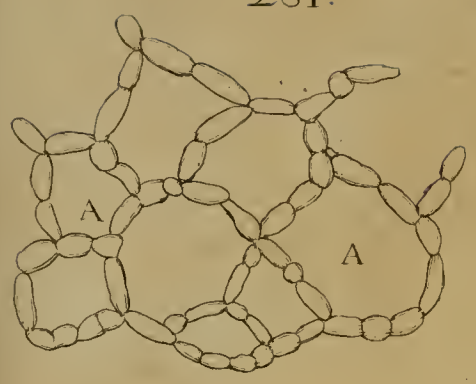
Quælibet ſeminalis plantula inſigni conſtat conico quodam corpore, quod, licèt ſpeciem trunci, ſeu caulis habeat, revera tamen, (ut in Diario *Vegetationis plantarum* patebit,) ferè totum abſumitur in radicem, & futurus truncus, ſeu plantulæ caulis, adhuc in ſeminali plantula minimus extat, & ſub ſpecie gemmæ Vegetatione attollitur & elongatur. Manifeſtantur hæc omnia paſſim in delineatis ſeminibus, & præcipuè in *amygdala*, & *ceraſis* 332; cujus gemma *A* parum acuminatâ conſtans formâ, foliorum complicatione excitatur; ſub hac, lacerati pediculi, in folium olim expanſi, cicatrix *B* obſervatur; infrà verò, plantulæ radix *C* exporrigitur. In *pomi Armeniaci* ſemine 333, plantula, ultra gemina folia carnem conſtituentia, conicâ radice *A* conſtat, & gemma pluribus laciniatorum foliorum ordinibus *B* donatur, qui geminis foliolis convolutis *C* cuſtodiuntur. In *juglande* elegans eſt plantulæ ſpecies 334: Brevis & depreſſa valdè eſt portio, quâ radix *A* ſtatuitur; reliquum trunci in gemmam abſumitur, cujus apex *B* complicatis foliis conglobatur. In *faſeolis*, evidentior eſt gemmæ conformatio 335, cujus folia parùm explicita conſuetam ſervant formam, ita ut brevi pateant & aperiantur. *Bulbaceorum* & ſimilium ſeminales plantulæ, radice, & gemmâ, veluti cylindrico curvato corpore, conſtant, quod utplurimum candidâ ſubſtantiâ, utriculis contentâ, cuſtoditur: Hujuſmodi patet in *lilio*, *aſparago*, & *ſativis cæpis* 336, quæ multiplici involucrorum ordine *A* ſeſe invicem continentium componuntur.

Senſu igitur compertum habemus, in jam expoſitis Uteris fœtum, plantulam ſcilicet ſeminalem, gigni, & foveri, & in vegetatione juvari: In horum

horum enim gratiam, corticis ſpecie, ſemen ſecundinis obduxit; in his namq; derivatus & percolatus à vaſculis humor, in utriculis veluti in tranſverſalibus ordinibus excoquitur, & fermentatur & in chorii, amniiq; concavitatem percolatur. Hoc expreſsè patet in leguminum corticibus, ſeu ſecundinis, quæ, quaſi Uterus, contentis humoribus à primordiis generationis turgent, ſenſim verò gracileſcunt, percolato ſucco in amnion, poſtremò in fœtum. In *amygdalis*, & conſimilibus, cæca inteſtinula, humore prægnantia, exteriùs eminent, quæ ſenſim exonerantur, derivato interiùs concocto humore. In exaratis corticum utriculis probabile eſt, concretum ſuccum & quaſi fixatum ſalem ſubſidere completâ plantulæ ſeminalis generatione; unde à Natura ſiphonum ordines in quamplurimis ſecundinis locatos videmus, quorum ope externus humor ſubintrans ſolvit & ſubigit relictum in utriculis ſuccum, & extractâ tincturâ, iterum quaſi inſtitutâ generatione, plantulam ſubit ad excitandam ſcilicet vegetationem. In *cydoniis*, ut retulimus, aliiſq; conſimilibus, mucoſus exteriùs affunditur humor, qui expoſitas firmat meditationes; nam fortè illiniendo diu fovet, quouſq; externo ſolutus icore, per fiſtulas cribratus, in plantulam poſtremò deferatur. Nec ſat fuit Naturæ, ſiphonum horizontalium ordines addidiſſe, ſed ovalis feneſtræ foramen, vel ejus loco patentem hiatum aperuit: *Sicut* enim in *Animalibus* fœtus non tantùm per umbilicum nutritur, recepto ſanguine, alimentitio ſucco commixto, ſed per os, derivato ſcilicet chylo in ventriculum, indéq; ſolitis viis in cavam, ut ſenſim inſtituatur hæc alimenti via, quæ in edito fœtu perennante vitâ manuteneri debet; *ita* probabiliter contingere reor in *ſeminalibus plantulis*: Siphones alimentum foliis miniſtrant, quod præexiſtenti in propriis utriculis ſucco commixtum, per propria vaſa gemmam versùs intrò deducitur, & ita plantula quaſi per *umbilicum* augeri videtur: Et quoniam hiatus in *pomis*, *pyris* & ſim; feneſtella in *ciceribus*, *fabis* & ſim. excitantur, ſub quibus extremum conici corporis, radicum ſcilicet inchoamenta conduntur, & eiſdem externum miniſtratur alimentum, ut regia nutritionis via inſtituatur, ab extremis videlicet radicibus in caulem vel caudicem, & ab his in ramos, & folia; ideò hanc nutritionis viam analogam ei puto, quæ per *os* celebratur in fœtu. His accedat, radicis truncum vaginâ, copioſis utriculis compaginatâ, condi, quorum ope extremo caudici debitum auctivum ſubrogatur alimentum. Interdum dubitavi, an feneſtellâ externus aer admittatur, ut fermentatio pariter excitetur, vel ſaltem incongrua eliminentur evidenti tranſpiratu; ut de umbilicalibus vaſis apud pleroſq; in Animalium fœtu dubitatum video.

Contentus fœtus, ſeu plantula, ſuis integrata partibus, taliter cuſtodita in longum etiam ſervatur tempus. In hac itaq; plantæ vera ſpecies compendio eluceſcit, & veri emancipati filii ſtatus innuitur; conicum enim, quandoq; oblongum, & interdum breve, occurrit corpus, quod vegetando

281.



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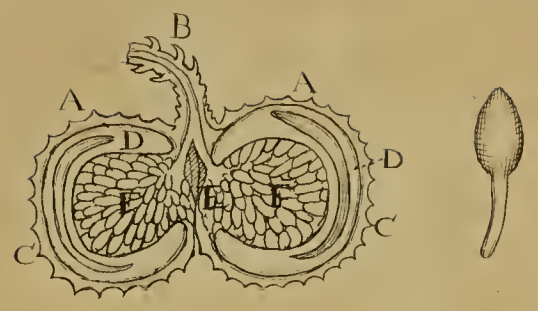

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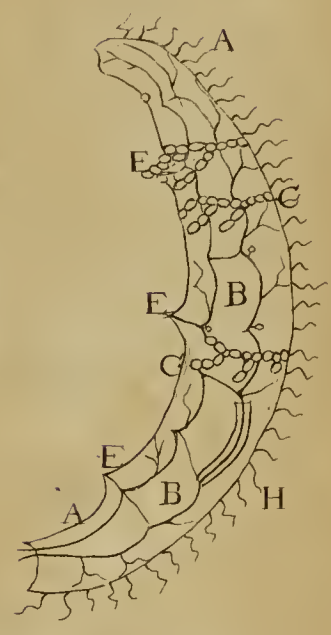

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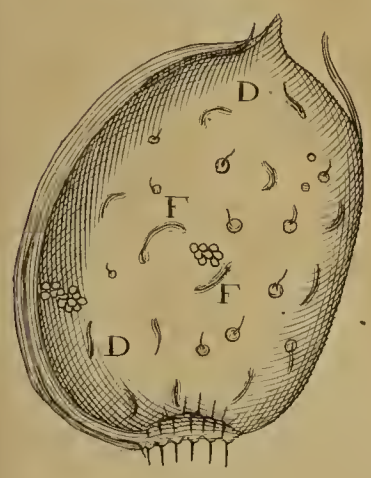

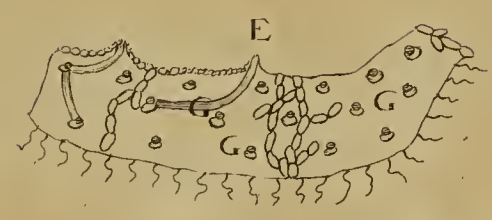

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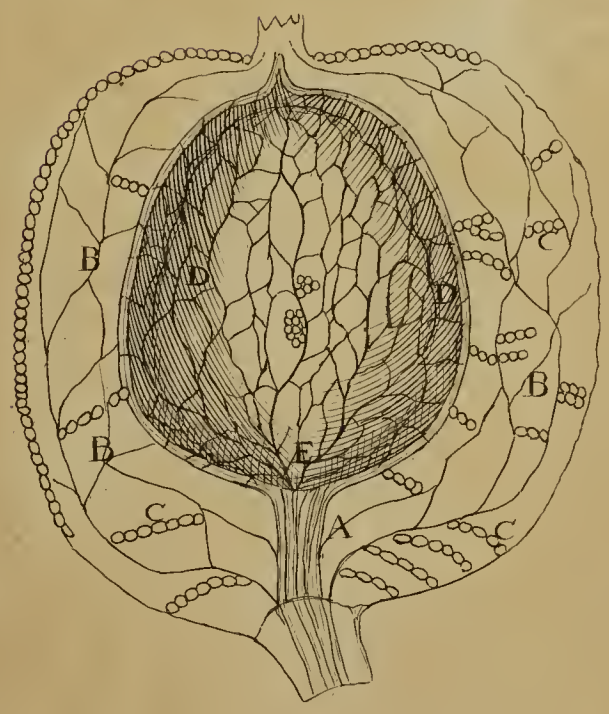

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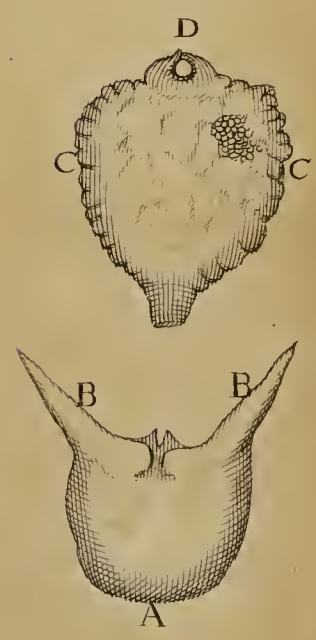

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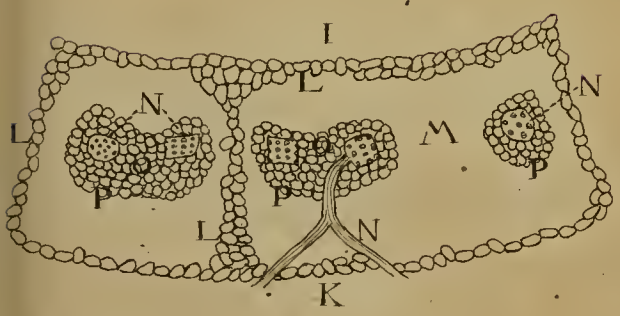

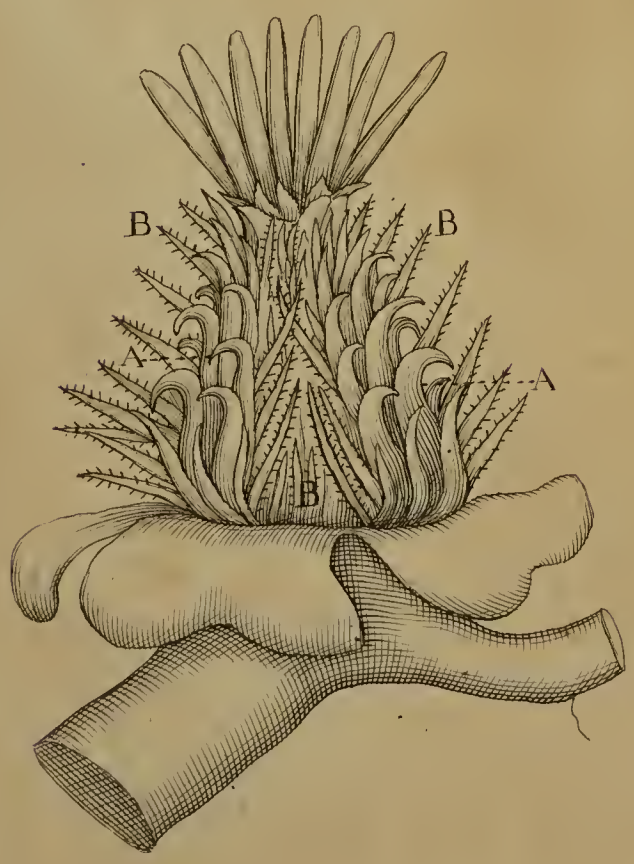

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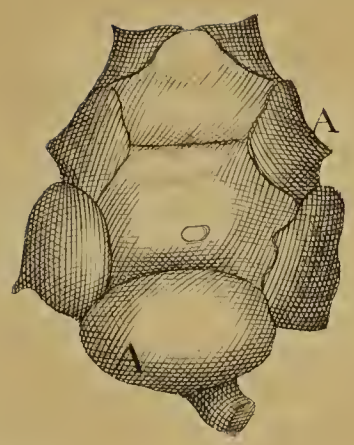

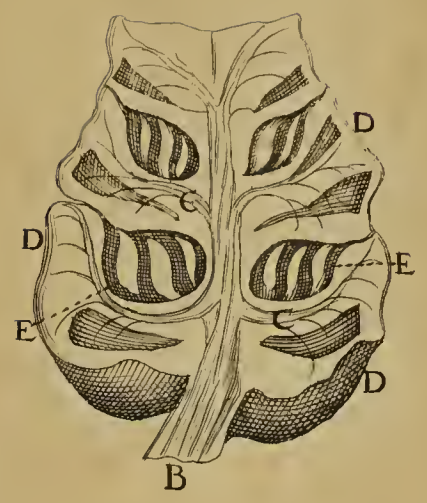

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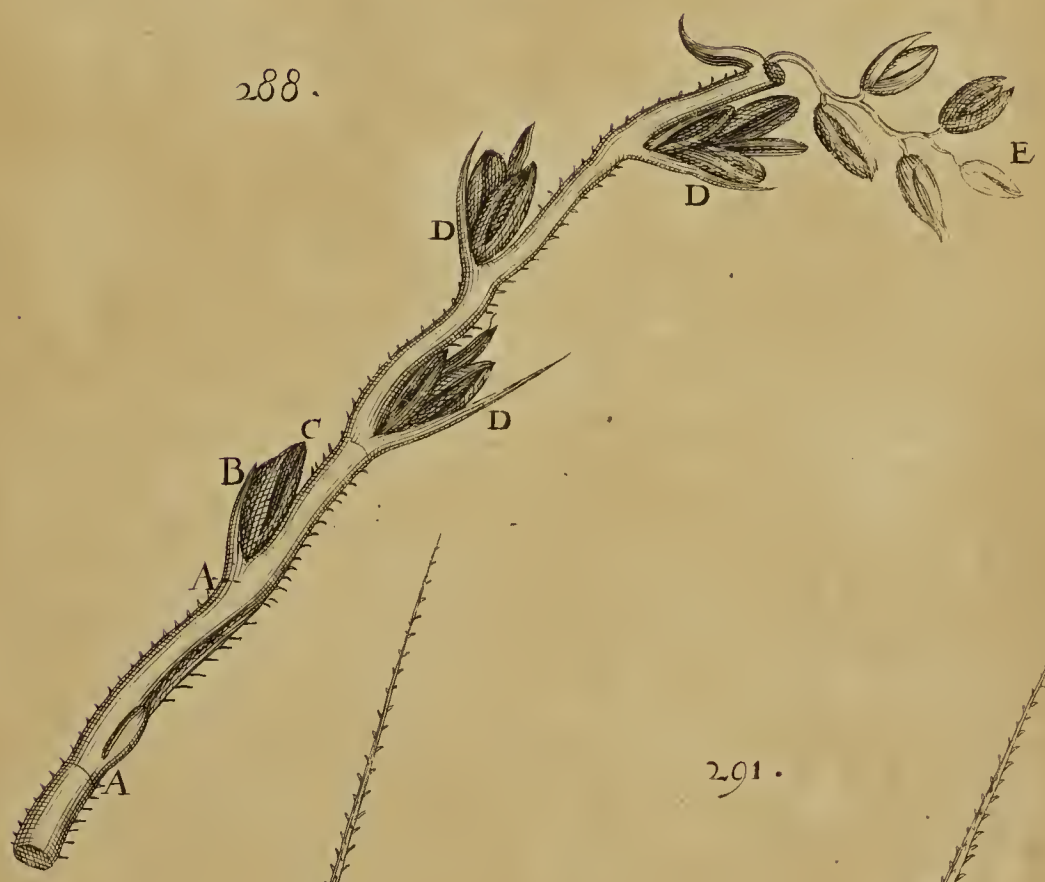

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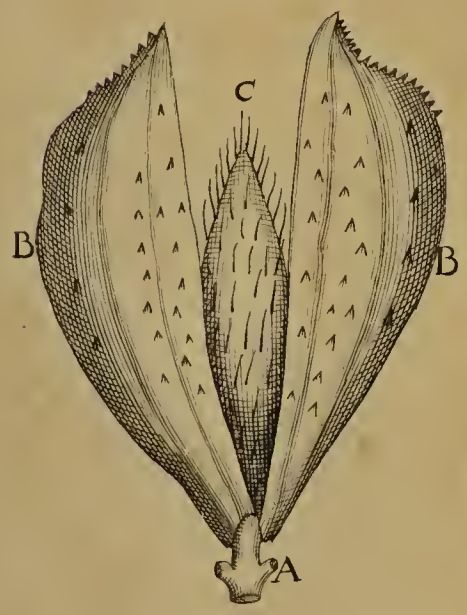

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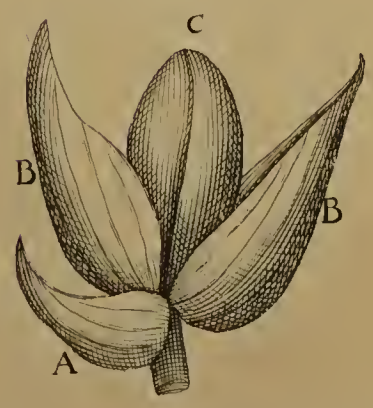

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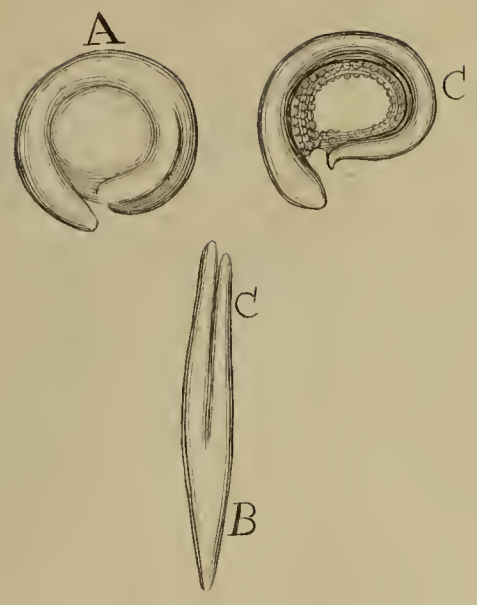

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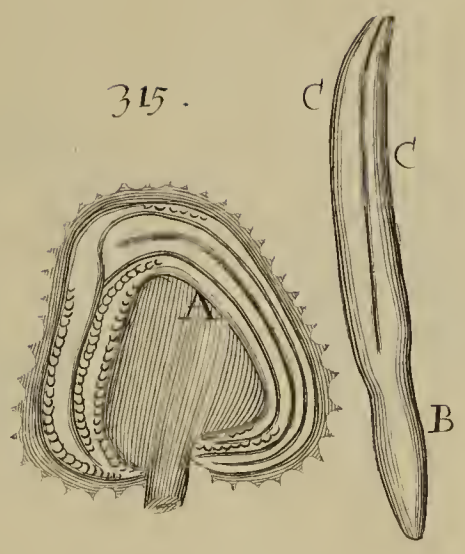

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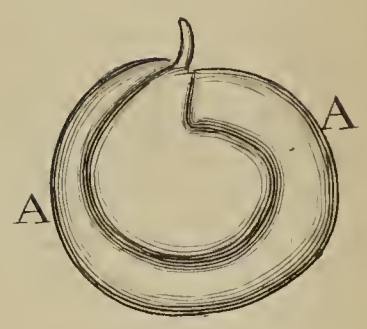

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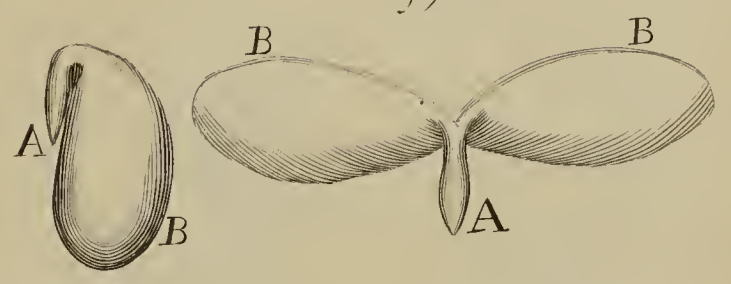

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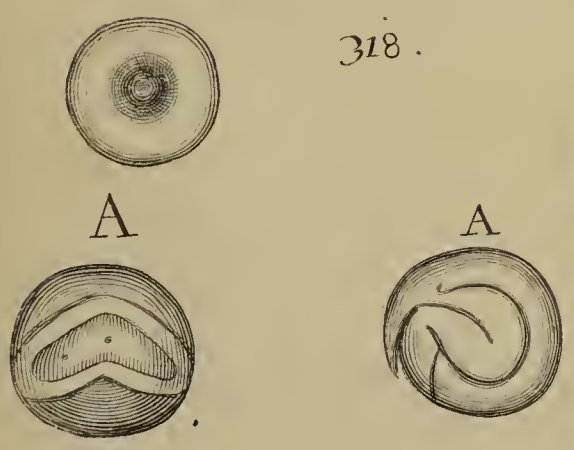

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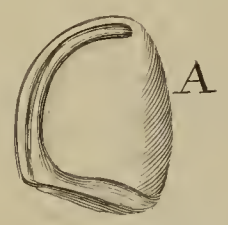

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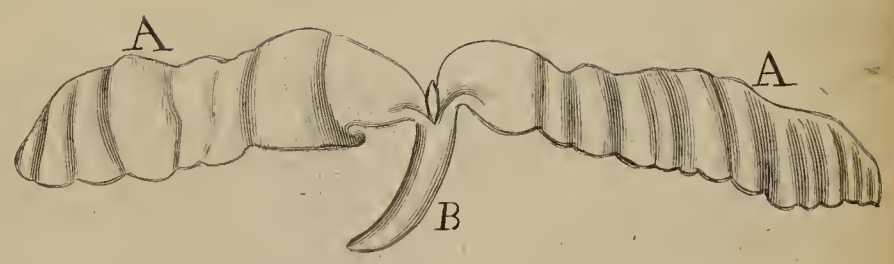

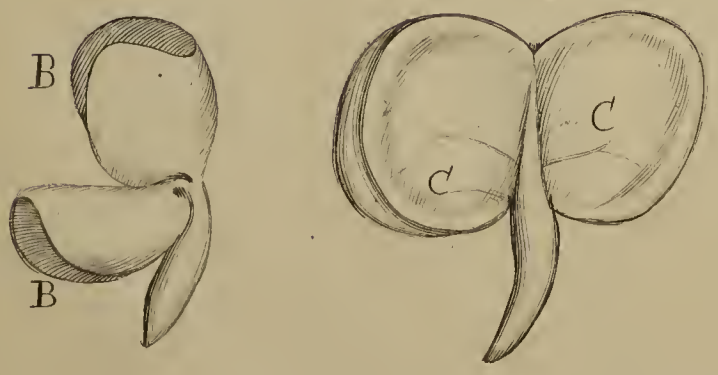

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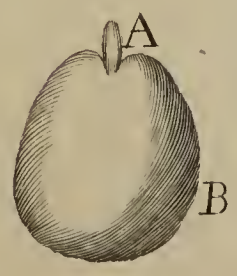

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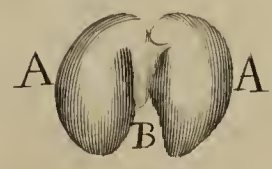

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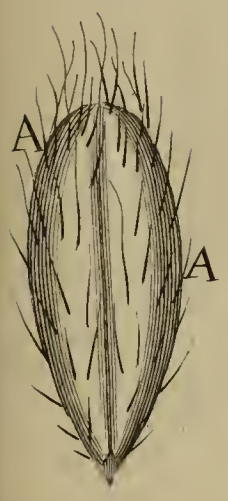

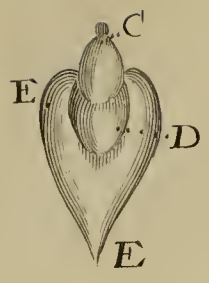

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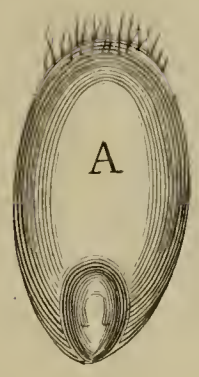

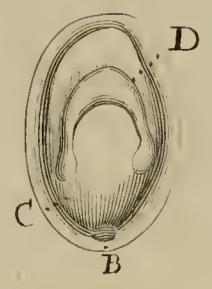

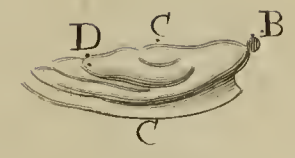

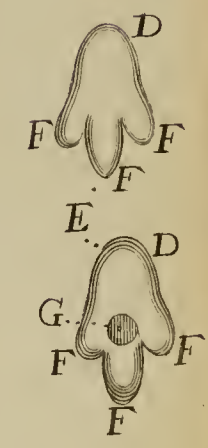

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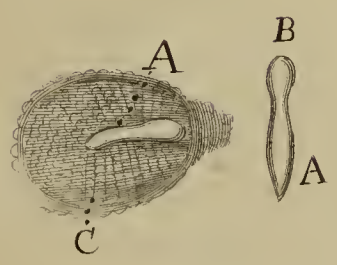

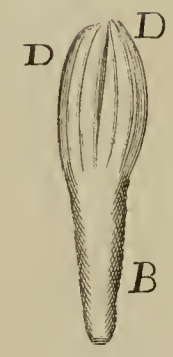

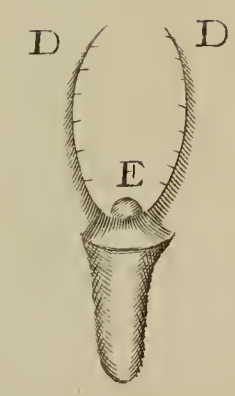

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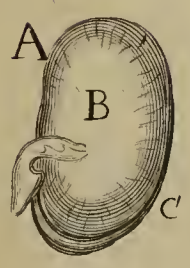

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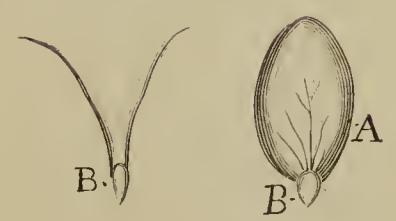

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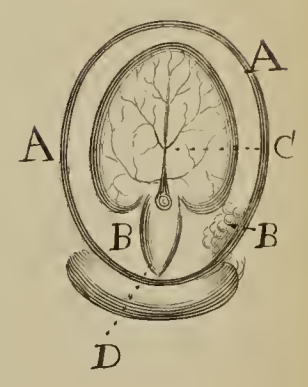

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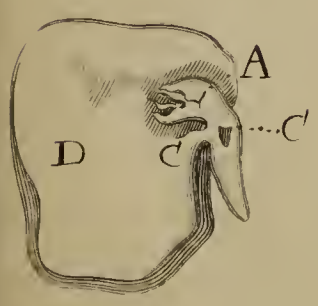

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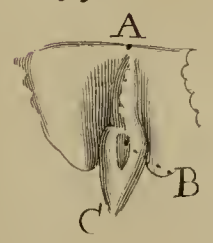

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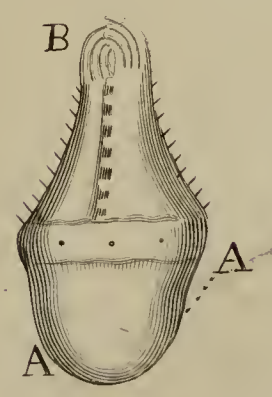

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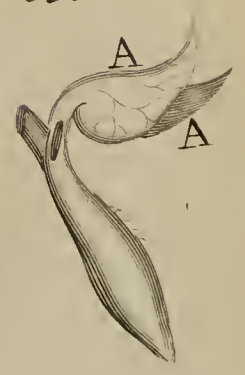

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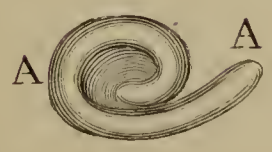

vegetandò radiculas promit, unde radicum truncus erit : Caulis autem, & Caudicis major portio ſub ſpecie adhuc gemmæ latitare videtur, à cujus principio & exortu gemina pendere vidimus ſeminalia folia, ſuis ligneis fiſtulis, tracheis, & utriculis conſtantia, quæ diu ſervatum ſuccum iterum plantulę reaffundunt, ut auctior redditus truncus, gemmâ ſcilicet & elongatis radiculis, ſenſim adoleſcat. In Vegetantibus, quorum ſeminales plantulæ laxatis foliis privantur (ut in *alliis* deprehendimus,) multiplices utriculorum ordines, in plantulam inclinati, auctivum ſuccum præbent, qui in iiſdem primò maceratur, & poſtremò effluit.

Vetus eſt *Empedoclis* dogma, plantarum ſemina *ova* eſſe, ab iiſdem decidua. Ovorum ſpecies tàm variæ ſunt, ut ad unicam naturam referri nequeant. In *Viviparis* enim, à primordiis, in *ovariis*, quæ *teſtes* vulgariter dicuntur, exigua continentur ova, in quibus cicatrix colliquamenti portione ambitur; hæc autem in uterum delapſa, & ibi fœcundata, adveniente ab Utero nutritio ſucco in novum excreſcunt ovum, adaucto ſenſim contento fœtu. In pennatis & *Oviparis*, ultra cicatriculam varii circumlocantur humores, qui Uteri vices ſupplent, & contento fœtui auctionem & nutritionem ſuppeditant. In *Inſectorum*, & quorumdam imperfectorum animalium minimis ovis, ultra cicatriculam exigua humorum moles extat, & brevi incubata animal promunt, quod ſucceſſivâ nutritione, externarum partium facta mutatione, diverſas ſubit apparentias, manifeſtatis & emergentibus pluribus membris, & quibuſdam etiam obliteratis. Alia pariter aderunt ovorum genera, nobis adhuc ignota. Illud unum videtur probabile in exaratis ovorum ſpeciebus, perpetuò animalis compagem contineri in aliquibus minùs explicitam, in aliis magis manifeſtam; reliquum verò circumaffuſæ ſubſtantiæ pro auctiva materia locari.

In ſeminalis plantulæ productione Ovum excitari vidimus; nam plantula, amnio contenta, percolato à chorio humore ſenſim augetur, & varias ſubit formas; donec acquiſita debitâ compage & ſtructurâ emancipetur, ſeparetur, & decidat à parente, ſuiq; juris facta in determinatum ſervetur tempus, & advenientibus exterioribus excitetur ad vegetationem, & propriâ vi, energiâ ſcilicet partium, quibus componitur, in novam excreſcat formam, & molem. Status igitur, quo quieſcit ſeminalis plantula ſui generis, *Ovum* dici poteſt; ineſt enim in eo, velut in cicatrice, non ſola viventis carina, ſed cum minimo trunco aſſurgentes partes, gemma ſcilicet, & inſignis radicis conus. His addamus, fermentativos pariter ſuccos in appenſis foliis locari par eſſe, ut modificatum alimentum ab extra adveniens plantulæ exhibeatur. Quare non Ovipa-rorum Ovis analoga erunt plantarum ſemina, cùm hæc, ultra incubatum, exterius expectent alimentum, quod in Ovo totum includitur. A

Viviparorum Ovis non longè distare videntur, cùm in utrisq; carina & viventis compages compendio præexistat, & tota ferè auctionis materia ab extra adveniat : In hoc tantùm differre videtur, quòd manifestior est *seminalis plantulæ* expositа compages *carinæ* inchoamento, quod animalium cicatriculam occupat : Et in Utero novum Viviparorum ovum perpetuam subit auctionem, & mutationem, percolatis continuò succis, à circumstante Utero decidentibus. Minus dissonum tamen erit reliquis Imperfectorum ovis, quæ, particulis receptis ab extra, turgentiam in contento colliquamento patiuntur; hæc verò humidis particulis soluto fermento, ovum, constituens plantulam, turgere facit, ut brevi discusso cortice ernmpat.

Ex his igitur probabiliter concludere licebit, plantarum semen *Ovum* esse, fœtum principalioribus compaginatum partibus continens, quod per annos etiam fœcundum conservari potest, donec turgente subingresso exteriori humore ipsius partes explicatiores reddantur, & ita Vegetans oriri dicatur plantula. Singula hæc manifestiora fient diariâ Vegetantium *seminum* indagine; quorum historiam & icones, Deo favente, unà cùm reliquarum partium promissis imaginibus dabimus. Interim, Amice lector, his, siquæ arrident, fruere, mihíq; aliquod vitæ spatium minùs valetudinariæ lubens precare.

FINIS.

MARCELLI MALPIGHII

Philosophi & Medici

BONONIENSIS

ÈSOCIETATE REGIA

APPENDIX,

Repetitas Auctasque

De Ovo Incubato

Observationes continens.

MAGNÆ SOCIETATI REGIÆ ANGLICANÆ

Marcellus Malpighius S.P.

CElebris apud Pictores mos est, *Doctissimi Sodales*, quo perficiendarum imaginum graphidem, primaq; in tabulis lineamenta, illico ac è materno phantasiæ sinu excidunt, continuatâ intuitus irradiatione fovere abstinent, ne statim adolescant; verùm ab oculis per longum tempus remota feriari jubent, donec inchoatæ prolis in artifice species obliteretur, quam subitâ postmodum lustratione examinantes absolvunt. Simile quid nobis in contemplandis Naturæ primis iconibus peragendum; mihiq; opportunum saltem & necessarium censeo. Sicut enim, eo temporis tractu, aberrationes, & incompta delineamenta, si quæ in tabulis extant, illico phantasiam omnino præjudiciis denudatam movent, & ab ea (non adhuc in sui amorem obfirmatâ) severi judicii imperio castigantur, & delentur, indeq; Naturæ magis consona depromuntur: Ita in meditandis Naturæ tabulis, rarâ, sed repetitâ, indagine comptiora emergunt mysteria, eliminatis antiquis conceptibus, qui olim *Palladis* arcem occupabant. Prima igitur Pullorum delineamenta incubatis Ovis (vobis ita consulentibus) singulo anno inquirenda mihi proposui; quæq; proinde in postrema aggressione observare contigit,

 brevibus

brevibus exarata hic habebitis, pro majori eorum, quæ aliàs innui, dilucidatione: In re enim tam obſcura, in re cui optica inſtrumenta parum proſunt, cùm uſus indicaverit rationem ſeparandi cicatriculam à vitello & albumine, exiguum ſubdubiæ lucis in primorum ſtaminum indagine effulſit.

In Ovo *nondum* incubato, fœcundo tamen, non abſimilis ab obſervatis aliàs & deſcriptis Cicatricula aderat, quæ inter galazas collocata, medium locum inter bina Ovi cacumina ſortiebatur, ejuſq; naturalis magni-
Tab. 1. tudo lentem non excedebat. In hujus itaq; centro circulus candidus *A*,
Fig. 1. aggeris inſtar, deprehendebatur, qui ſuperiora versùs cum veſiculis *F* interdum continuari videbatur; in hoc colliquamentum *C* continebatur, in quo pulli carina *D* candidis delineata zonis innatabat, quæ in ſummitate quandoq; diſcontinuatæ apparebant; contentum verò ſpatium plumbei coloris icore replebatur. Carinæ extremitatem ſacculus *E* obſcurabat. Succedebat lata quaſi faſcia *F*, quæ tandem umbilicalis area evadit: Hæc partim ſolidâ, hacq; ſubvitellinâ, partim liquidâ & fuſcâ integrabatur, portione, & à colliquamenti rivulo *G* ambiebatur, quem angularis zona candida *H* circumdabat.

In Ovo, elapſo *Julii* menſe ab *Indica gallina* incubato, poſt *horas ſex*
Fig. 2. cicatricula naturalem hanc ſortiebatur magnitudinem *A*, in cujus centro veſicula *B* irregularibus interdum finibus terminata, diaphanoq; turgida humore locabatur. Pulli carinæ & capitis inchoamenta zonæ ſpecie *C* emergebant, in colliquamento plumbei coloris innatantia, quod circulo *D* quaſi aggere coercebatur. Succedebat lata quædam umbilicalis faſcia *E*, ſublutei coloris, quæ interdum foraminulis pervia, pumicis inſtar, colliquamento madida reddebatur, cujus ambitum rivulus *F* alluebat, &
Fig. 3. tandem candidus circulus *G* omnia continebat. In aliis, umbilicalis area *H* in icorem quaſi fuſa, fuſca reddebatur, & plures circuli *I* interpoſitis alveolis *K* circumducebantur.

Poſt *duodecim horarum* incubatum cicatricula tali pollebat magnitudine
Fig. 4. *A*, in cujus centro colliquamentum *B* obſervabatur cum carina, quæ candidis delineata zonis rotundum capitulum deſignabat, & ultra medietatem orbiculares vertebrarum veſiculas, hinc inde adſtantes *C*, primò exhibebat; hujus tamen ſtructura ſacculo *D* frequentiſſimè velabatur. Succedebat candidus de more circulus *E*, qui exteriùs copioſo colliquamenti rivulo *F* ambiebatur; huïc proxima extendebatur area umbilicalis *G*, quæ lato rivulo *H* alluebatur. His addebantur quandoq; plures circuli *I* taliter circumducti.

In aliis cicatriculis ita incubatis ſimplicior emergebat configuratio in
Fig. 5. umbilicali area *K*, & ambiente circulo *L*, lato ſatis. Pulli carina candidâ quadam zonâ deſignabatur, quæ duplici excreſcens tumore, capitis inchoamenta *M* indicabat, & vertebrarum globulos *N* hinc inde hærentes habebat.

Tranſactâ *decimâ octavâ horâ*, cicatricula hujus latitudinis *A* versùs obtuſum Ovi cacumem aſcendebat. In medio colliquamentum ſolito aggere

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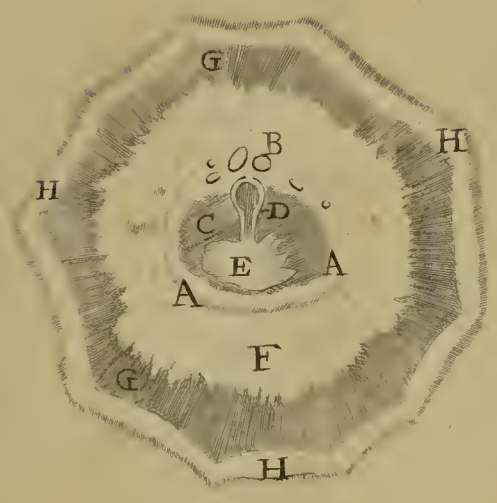


II.

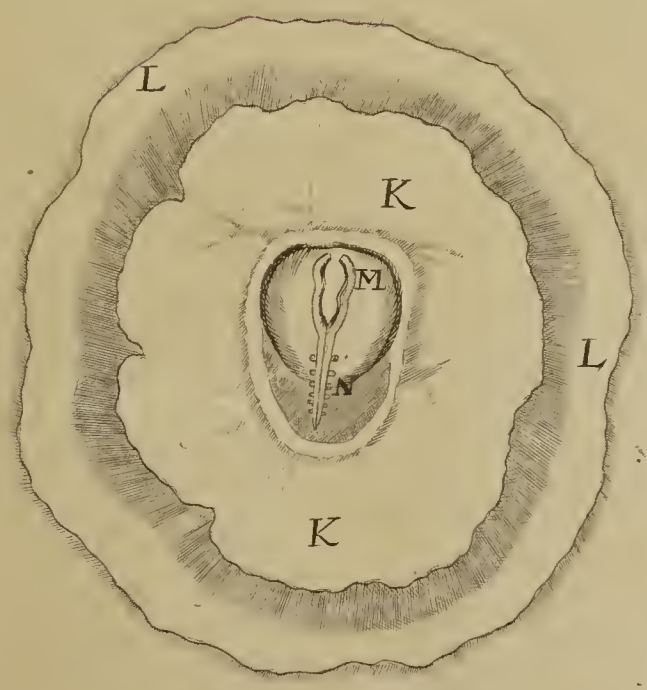
A

III.

A

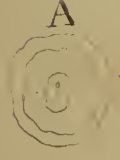
IIII.

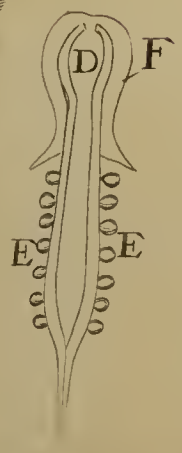
V.



VI.

A





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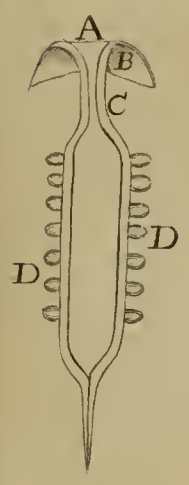

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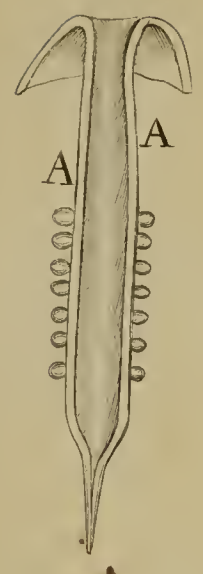

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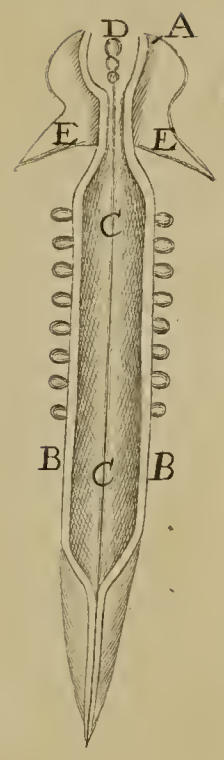

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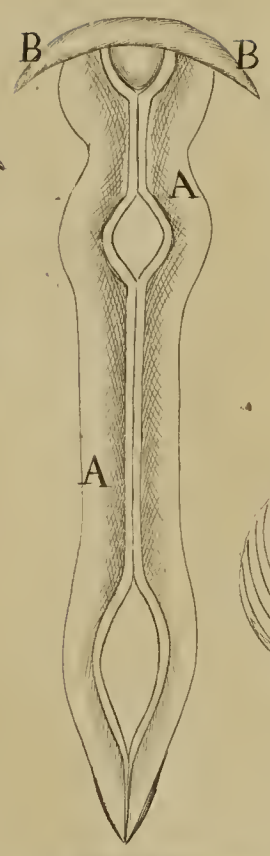

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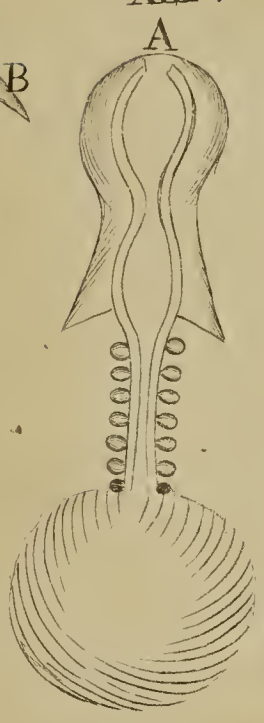

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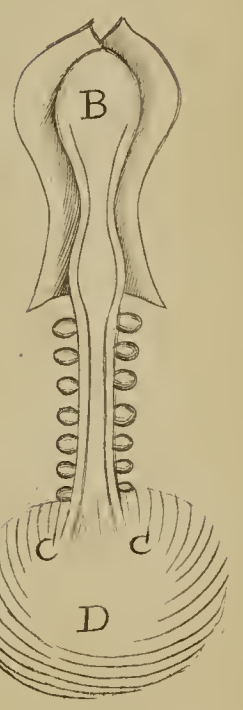

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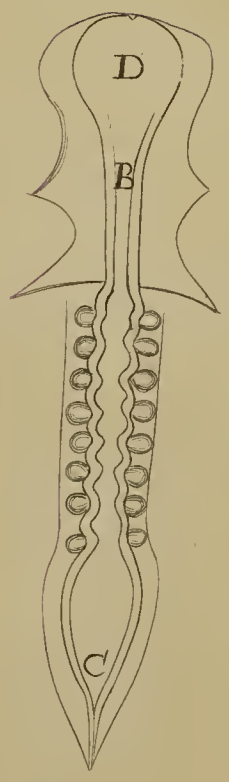

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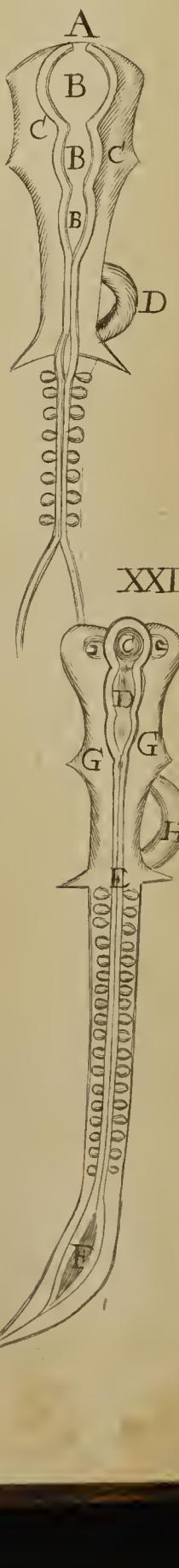

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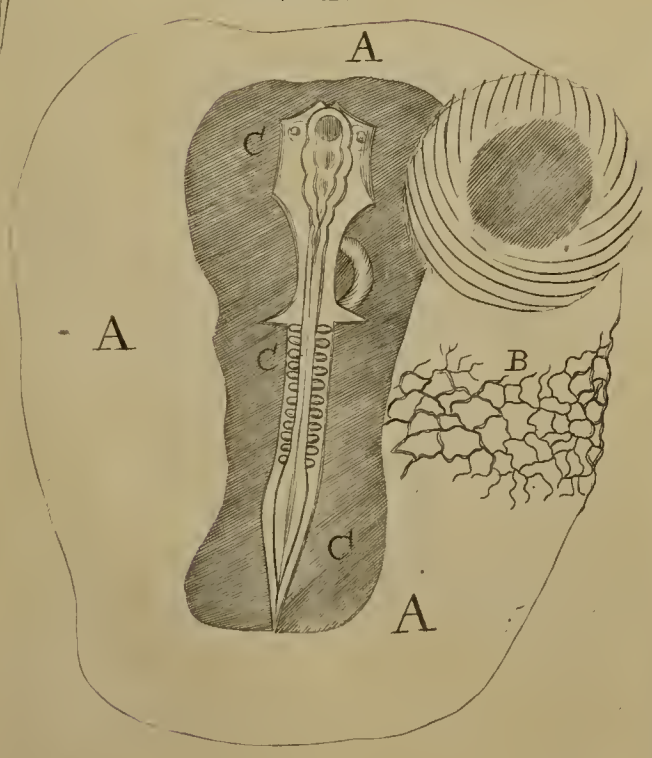

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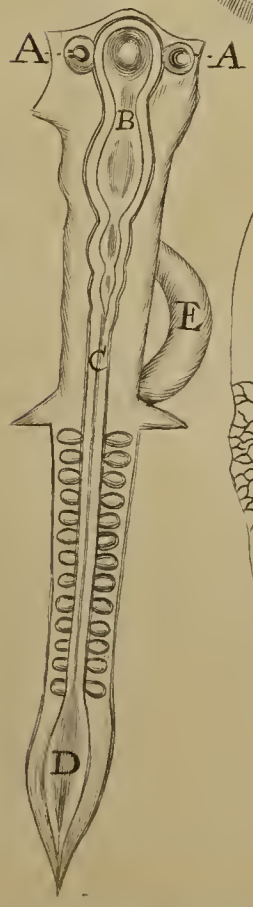

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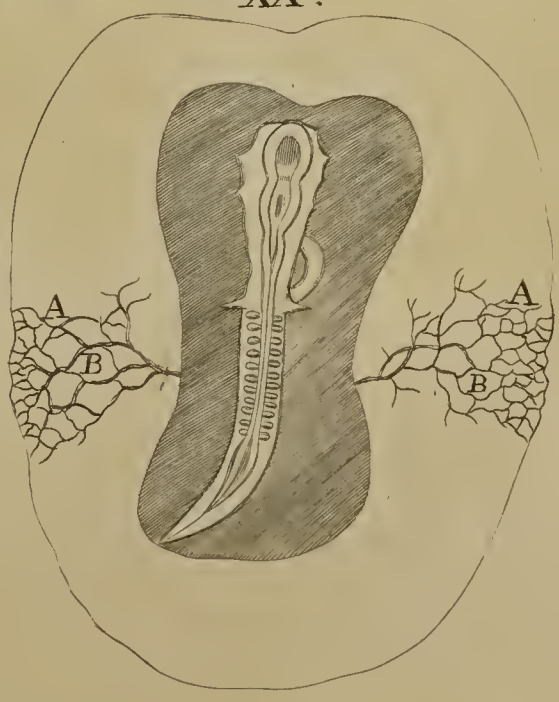
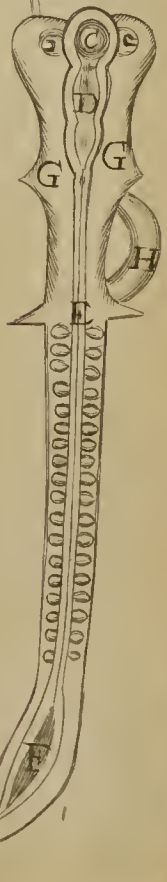


XXI.



gere *B* coercitum, pulli carinam continebat, quæ de more veſiculâ *C* obducebatur. Carinæ ſtructuram diu inquiſitam, talem tenere videbar. Ex candidâ zona caput *D* deſignabatur, & ſpinæ tractus cum appenſis vertebrarum ſacculis *E*; circa caput & collum, carnem *F* luxuriare non ſemel videbam cum alarum inchoamentis. Succedebat lata area *G*, colliquamenti alveolis *H* excavata; hæc rivulo ambiebatur, qui candido erat circulo *I* obſeptus. Umbilicalis hæc area inter obſervandum evacuato albumine rugoſas quaſdam eminentias, veluti arborum radices, exhibebat, quæ vaſorum ſpeciem mihi indicabant; quoniam tamen in exſiccata quacumq; vitelli parte parum abſimiles rugoſas productiones excitari facilè videbam, ideo adhuc hæret animus, an vaſorum latentium rudimenta exiſtant, an ſicceſcentis corporis rugæ. Cicatriculę extremus circulus ſeu zona *I*, ulteriori fermentatione in plures, hoſq; diſparatos, ſolvebatur circulos *K*, quorum portiones, velut inſulæ, colliquamento *L* mergebantur. Fig. 6. Fig. 7.

Placebat interea, ut Naturæ methodum aliqualiter tenerem, carinam fuſiùs proſequi; & quę varię ſpecies, uſq; ad integrę diei complementum occurrebant, prout in re tam obſcura rudibus inſtrumentis mihi attingere licuit, hic exarabuntur. In Ovis itaq; minùs vegetis & infirmioribus carina taliter apparebat; geminę zonę, ſeu craſſæ candidęq lineę *A*, in capite parum diſtantes, & quaſi reflexæ in poſticam partem *B*, iterum approximatę, collum *C* efformabant; mox diductæ, & quaſi parallelę, in longum protractæ, carinatum ſpatium efficiebant, & hinc inde vertebrarum ſacculos numero ſeptem *D* appenſos ſervabant; iterum tandem coeuntes, carinę extremum conſtituebant. Quid ſimile miratus ſum poſt diem integrum incubatûs, dum zonę *A*, parum obliquatę, carinam conſtituebant. In aliis gemina concavitas excitabatur *A*, & dorſi ſpatium, quod aliàs patebat, conniventibus zonis in *B* claudebatur; hoc enim familiare ipſi Naturę ſæpiùs obſervavi, in zonis motum adeſſe, ita ut ſuo acceſſu & receſſu, areæ & ſinus excitarentur & tollerentur. Tab. 2. Fig. 8. Fig. 9. Fig. 10.

Elabente die ſæpiùs ſpecies hæc occurrebat, qua capitis tumor *A* emergebat, & diductis in dorſo zonis *B*, carinæ concavitas efformabatur, quæ ſpinali medullę *C* locum præbebat, cui veſiculę cerebri *D* appendebantur; colli, capitis, & alarum *E*, productiones magis manifeſtabantur. Craſſę lineę, ſeu exaratę zonę, quę varias deſignabant jam expoſitas carinæ ſpecies, erant extremitates & fines aſſurgentium quaſi parietum; in extracta etenim cicatricula, & vitro impoſita, zonarum latitudo *A* occurrebat, quâ totus ſpinę tractus delineabatur cum alarum *B* inchoamentis. Hujuſmodi zonæ non perpendiculariter elevabantur, ſed inclinatæ, carinæ concavitatem producebant, quæ cryſtallino quodam humore replebatur, qui interdum ita turgebat, ut continentes zonas diſrumperet, & areas novas excitaret. Fig. 11. Fig. 12.

Aliud inſuper innuendum, zonas in apice *A* hiatum habere, qui quandoq; & temporis tractu claudebatur; hoc autem fortè natura utitur pro colliquamenti ingreſſu. Nec reticendæ ſunt mutationes, quæ in eadem Fig. 13.

numero

numero cicatricula & carina absq; novo incubatu manifestabantur; nam expositus hiatus in eodem Ovo, per sex horas aeri relicto, claudebatur,
Fig. 14. & capitis concavitas *B* candida tota reddebatur, & carinæ extremitas ex diductis zonis *C*, non obstante sacculo *D*, emergere incipiebat: Ulterior succedebat, *elapso die* à prima Ovi lustratione, mutatio; clausis namq;
Fig. 15. zonis geminus observabatur tumor *E*, circa dorsum curvabantur zonę *F*, & carinæ ovalis area patebat.

Fig. 16. *Transactâ die*, cicatricula hanc servabat magnitudinem *A*, & in sui centro carina locabatur, cujus zonę parallelę ductę, colli *B* situm designabant; mox vertebris hærentes, dorsum constituebant, & tandem dilatatæ carinę extremum *C* claudebant; in capite verò *D* hiabant, & tota area candida erat: In aliis autem, rudimenta vesicularum cerebri & spinalis medullæ emergebant. Carina hæc, in colliquamento *E* degens, proxima erat sacculo *F*, qui diaphano turgere videbatur succo. Lata sequebatur zona, quæ irruenti colliquamento *G* obstabat; unde umbilicalis area *H*, quasi tot excurrentibus rivulis interrumpebatur; postremò latus circulus candidus cicatriculam claudebat.

Interea progrediente incubatu, carina tumores circa caput multiplica-
Fig. 17. bat; zonæ etenim in apice *A* hiatum adhuc servantes tres areas *B* constituebant, quibus vesicularum cerebri inchoamenta custodiebantur. Caro *C* circum adstabat, & vertebrarum globuli dorso hærebant; cordis pariter portio *D* manifestabatur, & in umbilicali area varicosa vasa prodibant, pallido & subvitellino turgida icore.

Post *triginta horas* cicatriculę circuli multiplicati, soluti & infracti ob-
Fig. 18. servabantur. Umbilicalis area *A* varicosis vasculis *B* contegebatur, quæ ab elatis solidis portionibus subpallearis substantiæ ambiebantur. Vasorum color primò vitellinus, mox rubiginosus erat. In eadem area vesicula deprehendebatur. Pullus in colliquamento *C* degens, talem sortiebatur configurationem. In capite, ubi geminę observabantur ap-
Fig. 19. pendices, oculi *A* emergebant; zonę unitæ, variis excitatis areis, quinq; cerebri vesiculas *B* ambiebant, & inde productam spinalem medullam *C*; in extremitate angularis dilatata area *D* locum laxatæ medullæ præbebat; vertebrarum sacculi adstabant. Hoc eodem etiam tempore Cor *E* certò deprehendebatur: Et adhuc cicatriculas in vitris exsiccatas servo, in quibus illud prostat.

Adhuc hæret animus in determinanda *Cordis* vel *Sanguinis prioritate*, cùm repetitis observationibus sensuum ministerio ea nequaquam firmetur. Illud certò constat, ante incubatum, carinæ stamina observari; deinde incubatu vertebras, cerebri & spinalis medullæ inchoamenta cum alis, & inducta carnea portione manifestari, corde, vasis, & sanguine latitantibus: Apparentibus autem rivulis in umbilicali area, probabile est, Cor etiam carinæ appendi; cùm ante *trigesimam horam* cordis structuram certò deprehenderim. Plurimum autem temporis intercedit, quo Cor & Vasa icor pervadit, modò lutei coloris, modò rubiginosi, rubescente postremò sanguine; unde adhuc conjecturam foveo, quam aliàs innui,

succum,

ſuccum, Vaſa & Cor fortè præexiſtere, & ſenſim manifeſtari, ut in arborum Ovis obſervamus.

Auctiora ſenſim reddebantur ſingula circa horas *triginta ſex* incubatûs; grandior etenim reddita cicatricula, umbilicalem aream vaſculis *A* cooperFig. 20. tam exhibebat; reticulare opus vaſorum grandioribus interdum ſpatiis *B*, quadoq; minoribus diſtinguebatur, & rami aliqui, aliàs oblique ducti, nunc aliqualem rectitudinem adepti, quaſi trunci dirigebantur. Iterum ſuſpicor, quin, ut olim innui, plexus integri vaſorum umbilicalium præexiſtant in cicatricula, & ſubintrantis icoris turgentiâ & motu manifeſtentur, ipſorum areæ extendantur, trunciq; erigantur, cùm in plantarum Ovis gemina foliola, quæ analoga fortaſſe albumini & vitello ſunt, vaſorum plexus, tum aeris tum alimenti, poſſideant. Carinæ ſtructura talis videbatur: In capite ſuprema veſicula *C* plumbeo icore Fig. 21. turgebat, reliquæ *D*, frequentiùs minores, diaphano ſcatebant humore, & contiuata medulla *E* in *F* aliqualiter dilatabatur, ut in adultis etiam obſervatur; caro *G* circà luxuriabat, & cor *H* parum eminebat.

Superatis *quadraginta horis*, in cicatricula evidentiores redditi venarum Tab. 3. ſurculi ab extremo limbo *A* in cor productionibus *B* deducebantur, à quo Fig. 22. umbilicalia vaſa, angulum *C* efformantia, reticulares ramos promebant, nondum perpetuò in grandiores propagines diſtinctos. Carina in colliquamento innatabat, & circa ipſam ſacculus *D* parum diſtans, futurus amnion, emergebat, reliquus amplior *E*, chorion erat: Pulli carina Fig. 23. talis erat: In capite ſolitæ veſiculæ cerebri turgebant, quarum prima, vitrum referens, reliquis innatare videbatur: Solita zona arctior reddita, cerebrum & ſpinalem medullam ambiebat: Hinc inde oculi *F* locabantur: Cor *G* turgidum pulſabat eâ ratione & rythmo, pro ut aliàs deſcripſi, & fuſiùs infra habebitur. Hac eadem horâ ſacculus *H* variato Ovi ſitu movebatur; perpetuò enim ſummitatem tenere tentabat. Diu etiam heſitavi, an infra an ſupra carinam locaretur hujuſmodi veſicula *H*, cùm diaphano turgeret humore; tandem, cùm ipſam in ſeparata â vitello cicatricula nequaquam incluſam deprehenderem, in ſubjecta vitelli fovea locari conjectatus ſum.

Poſtremę obſervationi *Cicatriculam* addam, quæ licèt *binis diebus* incubata fuiſſet, quoniam tamen Ovum reliquis tegebatur, & humiliori loco condebatur, ideo frigidum, dum auferretur, erat, & ignavum valde. In hac itaq; ambientes circuli *A* fracti erant, coloriſq; ſubvitellini, & mer- Fig. 24. gebantur in colliquamento *B*. In medio umbilicalis area *C* locabatur, quæ limbi *D* loco zonam albam habebat, & convexa ibidem reddebatur: Hæc reticulari vaſorum opere *E* contegebatur, in quibus rubiginoſus humor turgebat. Carina, ſolitis prædita veſiculis & corde, innatabat in colliquamento. Spatium, quod inter circulos *A* & umbilicalem aream *C* extendebatur, inſignibus rivulis *F* alluebatur; in dextro enim latere veluti à tot diſtinctis fontibus deducebantur alveoli *G*, qui ampliores redditi ſub area umbilicali ultimum ſortiebantur terminum: Con-

tentus icor rubiginoſus erat, & ejuſdem penè naturæ ac in corde & vaſis obſervabatur; unde pulcherrimum occurrebat ſpectaculum.

Subſequentibus horis uſq; ad complementum alterius diei umbilicalia vaſa varicoſa, coloris primò ſublutei, mox rubiginoſi, & poſtremò ſanguinei, reddebantur. Extractus pullus hac pollebat figurâ: Cerebri ve-
Fig. 25. ſiculæ *A*, turgidæ cum ſpinali medulla *B* continuabantur, quæ zonis *C*, adhuc exiſtentibus, ambiebatur; circulus niger patenti hiatu *D* ſolutus oculi ambitum conſtituebat & cuſtodiebat.

Tab. 4. Poſt *binos dies* cicatricula lateraliter vitello hærens, ſenſim horizon-
Fig. 26. talis fiebat, cujus naturalis magnitudo erat *A*, & in ipſius centro in colli-
quamento natans pullus locabatur, qui veſiculis *B*, cerebrum integranti-
Fig. 27. bus, ditabatur: His cerebellum *C* cum ſpinali medulla *D* addebatur, quæ zonis *E* cuſtodiebatur. Hujuſmodi verò curvatæ interdum, & varicoſæ redditæ, vertebrarum ſacculis hærebant. Propè extremitatem carinæ amplior reddita medulla in ovale extendebatur corpus *F*; circa
Fig. 28. collum & caput caro *G* luxuriabat, & alæ *H* pendebant; bini pariter oculi circulo *I* excitati eminebant, quo cryſtallini humoris inchoamen-
Fig. 29. tum ambiebatur. Cor evidentiſſimè pulſabat; nam auricula *K* receptum à venis *L* ſanguinem pulſu propellebat in dextrum cordis ventriculum *M*, à quo iterum protrudebatur in ſiniſtrum ejuſdem ſinum *N*; inde in arterias, à quibus in truncum, qui deorſum productus geminaba-
Fig. 30. tur in ramos *O*; hi, umbilicales arterias *P* promentes, in aream producebantur, & tandem reticulari excitato plexu, in limbum deſinebant, qui quandoq; quaſi trunco *Q* excitabatur, quandoq; reticulari plexu ex ſuperpoſitis arteriæ & venæ reticularibus implicationibus. In cicatriculis ignavioribus loco umbilicalium ramorum *P* rete obſervabatur cum areæ ſurculis continuatum; quod poſt *quadrageſimam quartam* horam frequenter accidebat. Humoris per vaſa fluentis color primò ſubvitellinus, mox fuſcus & rubiginoſus, poſtremò ad ſanguinem tendebat. Veſicula *R*, diaphano turgida humore, propè umbilicalem ramum *P* dextrum locabatur.

Triduo elapſo, cicatricula parum deficiebat ab horizontali ſitu, ejuſq;
Fig. 31. magnitudo naturalis non excedebat *A*. Pullus in ventrem jacebat, ita ut ſpinæ *B* tractus à cerebello *C* deductus pateret, vertebris *D* hinc inde unâ cum zonis *E* adſtantibus. Cerebri criſtata veſicula *F* præ cæteris emergebat diaphana, turgidaq; humore; reliquæ *G* & ipſæ manifeſtæ erant. Oculorum circuli adhuc patentes erant; alæ *I* extendebantur, crurumq; *K* & uropygii inchoamenta apparebant. Cor auctius erat,
Fig. 32. unde receptus ab auricula *L* ſanguis à vena *M* per ductum *N* in dextrum cordis ventriculum, indeq; per *O* in ſiniſtrum *P*, tandem in arterias *Q* propellebatur, à quibus in truncum *R*: Ab hoc erumpebant umbilica-
Fig. 33. les rami *S*, qui productis ſurculis in limbum deſinebant, reticulari effor-

mato

mato plexu. Interdum umbilicales rami geminis finibus *T*, ſupra limbum inclinatis, reticulare venarum opus *V* cooperiebant. Ab extremo carinæ erumpebat venoſus ramus *X*, qui cum limbo continuatus ſanguinem revehebat, non diſpari ritu ac in ſuperioribus accidit. Extracti interdum cordis hanc licuit obſervare ſtructuram, in qua craſſior meatus à dextro in ſiniſtrum cordis ſinum apparebat circumpoſitâ carne *Z*. Taliter conſtructus pullus in arcto amnii receptaculo *Y* morabatur, quod à chorio ⁎ ambiebatur. Fig. 34. Fig. 35.

Poſt *quartam diem* longè auctior cicatricula, non adhuc ex toto horizontalis erat: Vitelli ſubſtantia valde palearis, albumenq; fuſum erat. Sanguinea vaſa ampla, & venę, ut plurimùm, latiores, limbum præcipuè amplo trunco pervadebant, excurrente ſanguine unà cum ſubluteo humore. In amnio pullus curvo corpore taliter jacebat: Caput præ cæteris turgebat; veſicula enim criſtata *A*, quæ in geminas videbatur dividi partes, cinereâ parumq; concretâ replebatur ſubſtantiâ: Non longè in occipite ſecunda locabatur cerebelli veſicula *B*, parum profunda, cui ſubjecta erat portio ſpinalis medullæ *C*: In anteriori parte profundiùs cuſtodiebatur *D*, & apicem binæ pariter terminabant veſiculæ *E*: Oculi cum nigro circulo *F*, & contentis humoribus, eminebant; inter hos & criſtatam veſiculam ſanguineum vas *G* amplum excurrebat. Carina ſubcinereâ molliq; carne tegebatur, ita tamen ut vertebrarum oſſa *H* parum elevarentur. Alæ *I* & crura *K* elongabantur. Non longè à capite ex hiante pectore Cor *L* erumpebat, cujus forma erat hæc: Primò itaq; ſanguis ab auricula *M* propellebatur per canalem ſubalbum *N* in cordis dextrum *O*, à quo in ſiniſtrum *P*, indeq; in continuatas arterias *Q*: Cordis ſtructura carne muſculoſâ evidenter excitabatur. Ab abdomine umbilicalia vaſa prodibant, & arteria *R* latior erat, rubicundoq; turgebat ſanguine; vena verò inferior & arctior ſubluteo ſcatebat humore. Prope umbilicalia vaſa veſicula *T* figebatur icore plena. Intus partium rudimenta condebantur, quæ candida & mollia rudem ſacculorum exhibebant ſpeciem. Contentus in chorio humor, veluti lactis ſerum, igne nequaquam concreſcebat, ſed excitata pellicula in bullas reſolvebatur. Tab. 5. Fig. 36.

Quintâ tranſactâ *die* auctior erat cicatricula, & pullus in colliquamento degens curvabatur & convellebatur; ejus naturalis magnitudo erat *A*. Amplum erat caput, quod criſtatâ veſiculâ *B* integrabatur; hæc filamentoſâ replabetur ſubſtantiâ; huic hærebat cerebellum *C*; anteriùs geminæ eminebant veſiculæ *D*, & ſuperiùs profundior locabatur veſicula *E*; hinc inde oculi *F* adſtabant: Reliquum corporis carne tegebatur, alis *G* & cruribus *H* extra pendentibus. Patente thorace cor extra locabatur, quod ventriculo dextro *I* & ſiniſtro *K* componebatur, ſuperpoſitâ pariter auriculâ *L*. Viſcera magis patebant, præcipuè Pulmones rubiginoſi coloris, diluti tamen. Umbilicalibus vaſis vitellum penetrantibus vitellinæ ſubſtantiæ hærebant. Fig. 37. Fig. 38. Fig. 39.

Sextâ

Sextâ completâ *die* albumen colliquatum erat ; umbilicalium area duas
Fig. 40. vitelli tertias occupabat. Vaſorum fines *A* in limbo frequenter reflectebantur, & inęquale rete mutuâ anaſtomoſi efformabant. Pullus in amnio cryſtallino cubabat : Solita aderat veſicularum cerebri ſtructura, &
Fig. 41. amplo vaſe *C* criſtata irrigabatur veſicula, eiq; proxima *D* obſcurabaFig. 42. tur, nec patebat niſi denudato & divulſo cerebro. Roſtri principium *E* emergebat. Patente adhuc thorace Cor apparebat, cujus ſiniſter ventri-
Fig. 43. culus *F* deorſum retractus, & dilatatus, conſocio incumbebat ventriculo *G*, ſuperextensâ auriculâ *H*. Interiùs jecur, renes, & pulmones magis patebant.

Manifeſtiora ſingula reddebantur ſuperatâ *ſeptimâ die* : Cubabat ete-
Fig. 44. nim pullus in amnio *A*, quod à chorio hîc diſrupto *B* ambiebatur ; nectebatur autem chorion vitelli membranæ prope limbum umbilicalium, quæ à pullo derivata, & in amnion, chorion & vitellum *C* producta, in-
Fig. 45. clinatis finibus *D* limbum efformabant. Reliquum vitelli *E* appenſam
Fig. 46. ſervabat glutinoſam albuminis *F* partem. Pullus ſolitâ pollens figurâ, capite & oculis conſtabat inſignibus, & criſtatę veſiculę *G* exteriùs fibrosâ integrabantur ſubſtantiâ ; interior verò ipſarum cavitas icore turgebat : Anteriores pariter veſiculę *H*, curvatæ, ſurſum retrahebantur, ſub quibus roſtrum *I* pendebat ; cerebellum cum principio ſpinalis me-
Fig. 47. dullę jam ſolidefactum erat. Thorax acuminatus erat, in quo levi tectum pelliculâ Cor pulſabat, in hanc redactum formam ; gemini enim ventriculi juxtà locabantur, & ſiniſter *K* amplior & rubicundior erat, dextra vero auricula *L* capacior. Ventriculus carnoſus, cum inteſtinis candidus, ritè conformatus obſervabatur ; coſtulæ niveę, & adhuc molles, jecurq; mucoſum erat, oblongis glandulis conſtans.

Interea uſq; ad *nonam diem* firmiora reddebantur viſcera, & Cor ſolitâ gaudebat formâ : Jecur xerampelinum, glanduloſis utriculis conſtans obſervabatur, qui diſtinctis areis, aliàs expoſitis, continebantur. Chorii icor, relictâ cruſtâ, igne in bullas reſolvebatur, quod idem amnii humori accidebat.

Tab. 6. Poſt *nonam* verò *diem* pullus longitudinis *A* in amnio, quod exiguum
Fig. 48. adhuc erat, innatabat ; chorion autem auctius erat. Umbilicalia vaſa, in vitello per ſuperiorem partem producta, venoſa erant, hæcq; lata ; arterię autem arctiores, vitelli tunicam profundè penetrabant. Umbilicus *B* latus continuatâ & elongatâ cute excitabatur ; ejus concavitas *C*, ab umbilicalibus vaſculis & pendentibus inteſtinis occupabatur. Exte-
Fig. 49. rior corporis habitus tumoribus *D* pro futuris pennis exaſperabatur. Cerebri criſtatę veſiculæ *E*, quæ in opticorum nervorum exortum deſinunt, minores & profundiores redditæ, ad latera inclinabantur : Idem accidebat anterioribus veſiculis *F*. Cerebri quoq; baſis jam penè ſolidefacti
Fig. 50. talis erat ; anteriores veſiculæ *G* patebant, nervorum pariter opticorum

exortus

exortus à criſtatis veſiculis *H* in oculos incurrebat; infundibuli portio *I*, à contigua excitata veſicula, cerebri continuitatem fulciebat, & non longè ſpinalis medullæ principium *K* pendebat. Pedes lati *L* obſervabantur, & roſtrum oſſeum producebatur.

Circa *decimam diem* chorii latitudo uſq; ad craſſum albumen extendebatur; fuſa valde erat vitelli ſubſtantia. Pullus curvo corpore jacebat, inſigniter protuberantibus oculis, qui nictitante membranâ *A* munie- Fig. 51.
bantur. Roſtri apex *B* oſſeus extuberabat; cerebri veſiculæ anteriores *C*, & criſtatæ *D* ſolidefactæ ſenſim obſcurabantur. Corporis habitus tuberculis *E* tegebatur. Circa umbilici exitum obducebatur labium *F*. Jecur rubiginoſi coloris cum glandulis, vaſis hærentibus, excitabatur, turgente bilis folliculo.

Abſolutâ *duodecima die* chorion *A*, ſanguineis vaſculis irrigatum, pauco Fig. 52.
ſcatebat ſucco, qui igne evaneſcebat in bullas; nectebatur verò membranæ *B*, craſſum albumen inveſtienti, recipiebatq; ſanguinea vaſa *C*, venam ſcilicet & arteriam, ab umbilico. Succedebat pullus, amnio *D* circumdatus, quod ab umbilico *E* producebatur; ab eodem etiam derivabatur vitellus *F*, cujus laxa erat membrana, oleoſam & glutinoſam continens ſubſtantiam. Hæc vitelli membrana undequaq; libera erat, ſoloq; limbo *G*, veluti ciliari ligamento, craſſiori albumini in ſitu *H* nectebatur: Per hanc vena *I* & arteria *K* ramificabatur uſq; ad limbum. Craſſum albumen *L* diaphanum propriâ donabatur tunicâ, & venas & arterias umbilicales recipiebat. Umbilicus *E*, quaſi inteſtinum, laxatâ & tubulosâ cute componebatur, & inteſtina *M*, foràs erumpentia, aliaq; inſuper ſanguinea & varicoſa vaſa continebat. Exteriùs plumæ erumpebant *N*. Cor hanc ſpeciem præ ſe ferebat; protuberante ventriculo ſiniſtro *O*, ſuperpoſitis auriculis geminis, dextra inquam *P*, & Fig. 53.
ſiniſtra *Q*. Jecur, debitâ conſtans formâ, veſiculam, viridi turgidam bile, appenſam habebat, cujus portio in carnoſum ventriculum deducebatur.

Decimâ quartâ elapsâ die, pullus flexâ carinâ in amnio *A* innatabat, Fig. 54.
quod gracillimis & penè inconſpicuis vaſculis irrigabatur: Ejus ſuccus adauctus, veluti ſanguinis ſerum, concreſcebat. Circumlocabatur vitelli moles *B*, cui hærebat craſſius albumen *C*; hæc omnia chorii tunicâ *D* ambiebantur: Per hanc producebantur ſanguinea Vaſa, quorum amplum *E*, ab umbilico emergens, tortuoſum & varicoſum redditum, ramos *F* progignens, in reticulare opus deſinebat: Proximè alterum excurrebat vaſculum rubicundius, eaſdem ramificationes ſortitum. Alia pariter ſanguinea vaſcula *G*, ab umbilico exorta, gracilitora, inter exaratas productiones *F* propagabantur. Pulli habitus totus ferè plumis contegebatur. Ungues & roſtrum ſolidam acquiſierant

naturam. Interiùs pulmones ſubalbi; ventriculus carnoſus, auctus, lacte replebatur; inteſtina extra in umbilico pendebant; fellis veſicula, ad cæruleum tendens, jecori appendebatur.

Subſequentibus diebus ſingula firmabantur, & ſenſim chorii humor abſumebatur, qui igne frequenter non concreſcebat; amnii verò humor tenuis & diaphanus in candidam interdum ſapidamq; cogebatur ſubſtantiam. Umbilicus carneus, craſſefactâ cute, extra pendula inteſtina cum ſanguineis Vaſis continebat. A vitelli tunica in tenue inteſtinum brevis meatus aperiebatur. Vas ſanguineum, quod altè pene-
Fig. 55. trabat vitellum, relictâ ejuſdem tunicâ *A*, inſigni ramo *B* pendulum, vitelli profunditatem occupabat, & reticularibus productionibus *C* eidem tunicæ *A* nectebatur; reliquis verò *D*, in fluida oleoſaq; ſubſtantia vitelli mergebatur. Circa hujuſmodi reticulares ramos *C* & *D* pinguedinis ſacculi *F* hærebant, qui venæ ramulis irrigabantur. In chorii cavitate Allantoides tunica ſenſim manifeſtabatur; leviſſima etenim mucoſaq; extendebatur bicornis membrana, in modum ſacculi, & ſubalbam candidamq; continebat urinam, quæ interdum filamentoſa, reticulare opus efficiebat; hujus exortus poſtremis diebus præcipuè patebat. Ventriculus cum continuatis inteſtinis ſolo turgebat lacte. Jecur poſtremò, ex rubiginoſo ſubluteum acquirebat colorem, & bilis cærulea erat. Cerebrum jam ſolidefactum in ſuperiori parte nervorum op-
Fig. 56. ticorum radices *A*, graciliores redditas, anteriores ventriculos *B*, cerebellum *C*, & principium ſpinalis medullæ *D* exhibebat; in baſi verò, ultra exarata, infundibuli regio aſſurgebat.

Tab. 7. Tranſactâ *decimâ nonâ*, chorii ſubſtantia *A* craſſior reddita, quaſi car-
Fig. 57. nea, exiguum continebat humorem, ejuſq; concavitatem Allantoides tunica *B* ferè ex toto occupabat, mucosâ referta urinâ *C*. Pullus calcitrabat, amnio *D* contentus. Umbilicus *E* amplus erat, & turgidus ex retracto interiora versùs vitello *F*, & ab ipſo, amnii *D* tunica in ſitu *G* producebatur. Intra umbilicum, ultra ſanguinea Vaſa, inteſtina meſaraicis irrigata condebantur.

Vigeſimâ completâ *die*, Ovi cortex de facili friabilis erat; craſſum item chorion, & ferè ſanguineum, non tamen fibroſum, & ſucco undequaq;
Fig. 58. vacuum, ſolaq; Allantoides tunica *A* continebatur, quæ urinæ ſtirias *B* reticulariter ita ductas & implicitas ut naturæ myſterium credereris, includebat; & tandem versùs umbilicum *C* deducta, & ventrem ſub-
Fig. 59. ingreſſa, efformato Uracho *D*, in extremum inteſtini *E* hiabat. Vitelli corpus in ventrem retractum exteriorem abdominis formam *F* excitabat. Jecur perpetuò lutei coloris erat, quaſi vitello turgeret; ejus verò fel cæruleum, materia in carnoſo ventriculo & tenuibus inteſtinis contenta lactea erat.

Poſtremò

Poſtremò pullus propè exitum pipiebat, & interdum ictu roſtri friabilem urgebat corticem; ejus venter *A*, turgidus & ferè rotundus ex condito vitello reddebatur; ſciſſura tamen *B* obſervabatur ex retracto umbilico, à quo Urachus *C* & umbilicalia Vaſa *D* prodibant. In aperto pullo vitellus *E* hujus magnitudinis, inteſtinis *F* brevi ductu *G* continuabatur; hæc â carnoſo orta ventriculo *H*, versùs extremitatem cæcales appendices *I* promebant, & dilatatâ ſui portione cloacam *K* efficiebant, à qua erumpebat Urachus. Vitelli ſubſtantia viſcida & oleoſa erat. Jecur adhuc luteum præ ſe ferebat colorem. Fig. 60. Fig. 61.

Hæc ſunt quæ Vobis imperantibus in tam profundo naturæ myſterio anniverſariâ hac aggreſſione viſus ſum attigiſſe, quæ licet rudi meâ delineata manu, incomptoq; exarata ſtylo extent, pro integro tamen animi voto penes Vos erunt, & fortaſſe ulterioribus ſubſequentium annorum firmata obſervationibus, naturæ normam in ducendis primis pulli ſtaminibus adumbrabunt.

Dabam Bononiæ die Octob. 1672.

FINIS.

Epiſtola

EPISTOLÆ

quædam circa has

De Anatome Plantarum

Auctisq;

De Ovo Incubato

Observationibus Dissertationes &c.

ULTRO CITROQUE SCRIPTÆ.

I.

Clarissimo viro

Domino HENRICO OLDENBURG

Societ. Reg. Angl. Secr.

MARCELLUS MALPIGHIUS *salutem.*

PLantarum * Anatomen, *cujus in indagine me jamdudum insudasse aliàs te monui, tandem in actuariolum informe congestam hîc habes, Vir clarissime. Hanc (si tantorum virorum congressu non indignam agnoscas)* Regiæ Societati *meo nomine exhibeas, rogo, ejusq; sincerum mihi aperire sensum ne renuas. Si enim supervacaneos meos judicaveritis labores, corpus ægritudinibus perpetuò fessum conquiescere sinam: At si non omninò inutiles judicaveritis, reliquum vitæ in his perficiendis insumam, prout mentis, corporis & fortunæ tenuitas permittet. Aliam observationum seriem quamprimum transmittam. Diu vivas, & mea studia fovere ne desinas.*

* *Hæc est diatribailla, quæ in hoc libro,* Plantarum Anatomes Idea *vocatur; quatuor circiter abhinc retrò annis huc transmissa.*

Dabam Bononiæ *Calend. Novemb.* 1671.

II.

Celeberrimo viro

Domino MARCELLO MALPIGHIO

Philoſopho & Medico Bononienſi

HENR. OLDENBURG *Sal.*

SCriptum *illud tuum,* Anatomes Plantarum Ideam *complectens, quod Ampliſsimo Regis noſtri apud Venetos mandatario huc tranſmittendum commendaveras, ritè mihi traditum, tuòq; nomine* Societati Regiæ *exhibitum fuit. Cùm illa partem ejus ſibi prælegendam curaſſet, indeq; Argumenti intellexiſſet dignitatem & momentum, mox ſecum reputavit, altioris indaginis rem eſſe, quàm quæ publicâ ejuſmodi feſtinaq; lectione poſſet pro merito expendi. Conſultum proindè judicavit, more ſuo uti, & Exercitationem hanc tuam Sociorum ſuorum nonnullis, talium imprimis rerum ſtudioſis gnariſq;, privatim per otium evolvendam excutiendamq; committere. Interim mihi in mandatis dedêre, ut dum eruditi illi viri Commentationem hanc tuam enucleatum irent, ſine mora tibi ſignificarem, permagnâ ſe animorum lubentiâ munus hoc tuum Philoſophicum eſſe amplexatos, daturoſq; operam, ut magis magiſq; prolixam ſuam in te benevolentiam, paremq; de egregiis ſtudiis tuis æſtimationem perſentiſcas. Etenim abunde jam palàm feciſti (quod pronâ mente agnoſcimus) dignum te eſſe, qui prima inter ritè philoſophantes ſubſellia occupes, quiq; reconditioribus Naturæ penetralibus rimandis ætatem abſumas. Ea profectò, quæ hactenus è ſcientiæ tuæ penu deprompſiſti, talem ſuo jure inter doctos plauſum meruêre, ut animos inde ſumere omnino poſſis, meditationes & ſtudia dua, hancq; imprimis de* Plantis *diatribam, citra eam quam ipſa præ ſe fert hæſitationem, provehendi.*

Quamprimùm Socii illi noſtri, quibus id penſi datum Anatomen tuam evolvendi, ſuam de ea ſententiam expoſuerint, officio meo non deero, eam tibi ſine fuco perſcribendi.

Hoc interim celare te nolim, Vir Præſtantiſſime, *quendam è Societate Regia Virum Medicum noſtratem,* * *idem illud Argumentum tractandum ſuſcepiſſe, quinimò eâ ipsâ horâ (quod fortè miraberis) quâ ſcriptum tuum à me proferebatur, libellum ſuum Anglicè jam editum laudatæ* Societati exhibuiſſe; *in quo* Plantarum Anatomen *tum ab ipſo arceſsit Semine, tum, ſingulis earum partibus earumq; Vegetandi ratione conſideratis, cum Semine claudit.*

* *Doct. Nehemias Grew.*

Animus certè eſt, primâ occaſione hunc tibi Tractatum nave Liburnam *velificaturâ tranſmittere, cujus Interpretem Anglicum in Urbe veſtra te non difficulter nacturum confido. Perſuaſiſſimum ſanè habeo, binas has Exercitationes, utut methodo elaboratas diſcrepanti, eum apud ſagaciores Philoſophos locum eſſe inventuras, ut uberem exinde Vegetationis argumento lucem illatam eſſe ſint exiſtimaturi, uberioremq; adhuc illatum iri, ſi tu & concivis hic noſter certatim porrò materiam hanc eâdem, quâ cepiſtis, curâ excolere pergatis, aliiſq; viris ſolertibus anſam hoc ipſo præbeatis, ſua quoq; meditamenta & ſymbola in rem eandem conferendi. Vale, & me tibi addictiſſimum crede.*

Londini d. 14. Decemb. 1671.

III. *Clariſſimo*

III.

Clarissimo viro
Domino MARCELLO MALPIGHIO
Phil. & Med. Bononiensi.

HENRICUS OLDENBURG *Felicitatem.*

Significaveram Tibi, Vir Celeberrime, per literas 14 *Decembris ad Te datas,* Soc. Regiam *Scriptum tuum de Anatome Plantarum nonnullis cœtûs sui Sociis perpendendum commisisse: Insimul pollicitus, me virorum illorum, quibus id pensi fuerat impositum, sententiam suo tempore candidè perscripturum. Hujus itaq; Epistola non aliud erit argumentum, quàm ut datam Tibi fidem liberem. Scire igitur Te velim, Philosophos illos nostros, rerum in Exercitatione illa tua traditarum perquàm callentes, ad unum omnes statuere, Te & subacto judicio & eximiâ curâ rem propositam tractasse, eamq; omninò mereri, quæ in lacum publicam quàm maturrimè emittatur. Dabis igitur operam,* Vir Doctissime, *ut nostram, & aliorum, quibus hæc res longè lateq; jam innotuit, expectationem, quamprimùm fieri id possit, impleas, eoq; ipso manifestum facias, hanc Naturæ partem uno hoc seculo amplius multò solidiusque, quàm cæteris omnibus prægressis, quantum quidem nobis constat, excultam fuisse.*

Promissi memor sum, quo me nuper ad Libri de Plantarum *etiam* Anatome, *à Medico Anglo perdoctè concinnati, transmissionem obstrinxi. In eo sum, ut de nave exquiram in oras vestras profecturâ; quâ occasione & plura fortè perscribam, quæ ad rei Philosophicæ incrementum facientia in his oris geruntur. Vale, & me tuum ex asse crede.*

Dabam Londini *d.* 18. Januar. 1672.

IV.

Clarissimo viro
Domino HENRICO OLDENBURG
Reg. Soc. Angl. Secret.

MARCELLUS MALPIGHIUS S. P.

Doctissimorum Virorum sensum, quibus placuit Exercitatiunculam de Plantis *evolvere, tuis humanissimis literis percepi. Parem in tam egregiis viris agnosco cum sapientia humanitatem, qui licèt Naturæ abdita impenetrabilia sciant, indagantium tamen vel minimos non aspernantur conatus. Peravidè exspecto præclarissimi vestri Medici promissum de* Plantarum Anatome *librum, in quo propositam materiam tam doctè & dilucidè examinatam me reperturum spero, ut meos omninò supervacaneos fore labores putem. Interim, in languidi corporis & animi solamen Observationes prosequar, prout mentis meæ tenuitas permittet.*

Alter jam excurrit mensis, ex quo tibi Observationum actuariolum circa Incubata Ova *transmisi, ut Consociorum placitum circa rem tam obscuram exploratum haberem; quod tuâ intercedente humanitate me consecuturum non ambigo. Tu, ut soles, me ama, diuq; vale. Dab.* Bononiæ *d.* 15. Martii, 1672.

V. *Clarissimo*

V.

Clarissimo viro

Domino HENRICO OLDENBURG

Soc. Reg. Secretario,

MARCELLUS MALPIGHIUS *Salutem.*

PUllorum *generationem in Incubatis Ovis* iterum *elapsâ æstate observatam, & in actuariolum redactam, ad Te transmittere placuit; ut studiorum meorum, qualiacunq; sint, normam habeas. Rude igitur hoc compendium inter otium percurras; idque, si non indignum* Regiâ Societate *censeas, meo nomine ipsi exhibere ne graveris. Scio, perpetuis & gravioribus curis Socios adeò detineri, ut in evolvendis Annuarum Observationum inconditis his studiis omninò tempus non vacet.*

Jam accuratissimam Plantarum Anatomen præclarissimi viri Domini Grevii *transmissum accepi, & pro tanto munere debitas tibi gratias ago. Doctissimam opus, amici ope, in Latinum versum præ manibus habeo, & licèt plæraque, ob minùs exactam Interpretis peritiam, mentem meam fugiant, præcipua tamen Authoris inventa tenere me puto. Gaudeo interim, me cum Accuratissimo Viro in quamplurimis observationibus & placitis convenire; reliqua autem, in quibus intercedere aliquid diversitatis videtur, ulteriori institutâ indagine solertiùs examinabo, ne, quæ tanti viri aciem effugêre, illusione quadam languidæ meæ imponant phantasiæ. Vidi in laudato opere varias Authorum circa* Flores, Spinas, *&* Folia, *indicari sententias. Libenter scirem, an hujusmodi jam typis edita fuerint. Valeas interim diu fœlix. Dabam* Bononiæ *die* 8. Octobr. 1672.

Responsum ad literas binas proximè prægressas annexum vide *Dissertationi Epistolicæ* de FORMATIONE PULLI in OVO, à *Malpighio* nostro ad *Reg. Societatem* scriptæ, & *Londini* typis mandatæ à *Joh. Martyn* A. 1673. Vid. ibid. p. 40. & seq.

VI.

Clarissimo viro

Domino MARCELLO MALPIGHIO

Phil. & Med. Bononiensi.

HENR. OLDENBURG. *S.*

MAgnopere *gaudet* Regia Societas, *dum intelligit, tua Te studia circa Plantarum Anatomen jugiter prosequi. Indefessum habebis, ni fallor admodum, laborum tuorum comitem Doctissimum* Grevium, *cujus alterum de isthoc argumento Tractatum prælo brevi exiturum speramus. Continet ille totius hujus Operis Anatomici Ideam, latè profectò patentem; subjectis quibusdam de* Radicibus *Plantarum Observationibus, quas Tibi non displicituras existimem.*

Accepimus, celeberrimum Mengolum *Tractatum edidisse de Auditu, Sono, & Musica. Ægrè sanè ferimus Bibliopolarum incuriam, quâ solâ evenit, ut virorum doctorum studiis & laboribus nimis serò fruamur. Est hîc Anglus quidam, in Musica tum theoretica tum practica apprimè versatus, cui consilium est, integrum*

syntagma

ſyntagma muſicum in lucem emittere. In votis proinde habet quàm maximè, Mengoliani operis copiam ſibi fieri, cujus voti quâ poſsit ratione compos reddi, equidem non video.

Prælo mandata jam ſunt Illuſtriſsimi Boylii *Exercitationes & Experimenta de Effluviis, de Ponderabilitate Flammæ & ſim; quæ ſuo tempore, commodam occaſionem nactus, ad Te tranſmittam. Jungam iis, quæ Doctiſsimus* Williſius *de Medicamentorum in Humano corpore operationibus imprimenda jam curat, reliquis ipſius laboribus, ut audio, nequaquam cedentia.*

Spero, Excellentiſsimum Finchium, *qui non ita pridem hinc in Italiam diſceſsit, Exemplaria ipſi concredita brevi ad Te curaturum; Equitémq;* Higgenium, *qui paucos intra dies Venetias contendet, alia nonnulla, Tibi haud ingrata futura, ſuperadditurum.*

Accepimus, nec Gallos Philoſophos ſibi deeſſe in ſcientiis augendis ornandiſq;. Hugenius *nuper edidit Tractatum de Pendulorum motu, ad Horologia aptato.* Mariottus *Diatribam de Percuſsione & de Libella:* Picardus, *de menſura Terræ:* Claudius Millet de Chales, *Elementa Mathematicè tractata, Terram ſcilicet, Aquam, Aerem & Ignem. Alii alia parant, de quibus ſine dubio propius edoceberis. Vale, & me Tui ſtudioſiſsimum amare perge.*

Dabam Londini *d. 7* Junii, 1673.

VII.

Celeberrimo viro

Domino MARCELLO MALPIGHIO

Phil. & Medico Bononienſi,

HENRICUS OLDENBURG *ſal.*

COmpluribus abhinc retrò menſibus, triginta ad Te expedivi Diſſertationis tuæ de Ovo *Exemplaria, typis Londinenſibus edita; Illuſtriſsimiq;* Boylii *egregiam de Gemmis Diatribam adjunxi. Curam eorum ſuſcepit Excellentiſsimus Regis noſtri ad Portam Ottomannicam Legatus, Dominus* Finchius, *qui terrâ hinc in Italiam profectus ſolenniter mihi pollicebatur, operam ſe daturum, ut ad manus tuas Exemplaria illa ritè pervenirent. Ex eo tempore, Siculo cuidam,* Paulo Bocconi, *inſignis Botanici famam adepto, librum, Anglicè à Cl. Grevio noſtro pronuper editum, Tibi perferendum tradidi. Tractat ille de* Radicum *imprimis ſtructura, deq;* Vegetandi ratione; *præmiſsâ ſuâ circa Hiſtoriam Phytologicam Ideâ; quorum omnium nullam Tibi partem diſpliciturum reor. Author ipſe ad Te ſcripſit, ſibiq; reſponſum, quàm primum commodè à Te parari id poterit, pollicetur.*

Identidem ex me ſciſcitantur noſtrates, quando tandem Commentarium tuum de Plantis, cujus prima ſchediaſmata penes me aſſervo, in lucem emittere velis. Si auſcultare libeat Amico, tui & honoris tui ſtudioſiſsimo, ſuaderem utique, ne rem iſtam diutiùs premeres. Ampliſsimus noſter Higgenius, *ad Rempublicam Venetam Ablegatus digniſsimus, qui haſce literulas ad Te curabit, operam*

daturus est, ut quæ de Argumento illo ad ipsum perferenda dederis, tutò ad me expediantur. Vale, vir optime, & si placet, quantociùs rescribe.

Dabam Londini *d.* 16. Martii 1674.

VIII.

Eruditissimo viro
Domino HENRICO OLDENBURGIO
Reg. Soc. Angl. Secret.

MARCELLUS MALPIGHIUS *Salut.*

MEnsis jam elapsus est, *ex quo* Anatomiam Plantarum *cum Iconismis capsulâ concluſam ad Ill^m D^m Ablegatum,* Venetiis *morantem, transmiſi, ut Tibi tutâ & opportunâ occaſione reddatur. Tuis epiſtolis adeò me ſollicitatum vidi, ut imperfectum, necdum abſolutum, Opus tranſmittere decreverim. Plura enim de* Seminum Vegetatione, Gallis, Radicibus, & Spinis *delineanda mihi ſuperſunt. Hæc interim libens recipies, ſolitâq; humanitate ſtudia hæc fovere non dedignaberis, mihiq; Sociorum, aliorumq; Literatorum ſenſum liberè aperire, ut mens mea, aliorum monitis cautior reddita, in reliquorum indagine rectiùs incedat, vel quieſcendo errandi occaſionem evitet.*

Doctiſſimi Grevii *librum de* Radicibus *&c. libentiſimè viderem; quare, ſi commoda tibi occaſio ſe offert, exemplar ad me tranſmittas, quæſo. Vale, & ſolitâ tuâ humanitate mihi favere ne deſine.*

Dabam Bononiæ, *d.* 17 Septem. 1674.

IX.

Clariſſimo viro
Domino HENRICO OLDENBURGIO
Soc. Reg. Secretario,

MARCELLUS MALPIGHIUS *Salutem.*

Librorum faſciculum, Domino Vernoni *traditum, Nobiliſſimi* Laurentii Magalotti *operâ nuper recepi, & elegans Illuſtriſſimi* Boylii *actuariolum ſumma cum lubentia perlegi. Ingenioſum pariter Cl.* Williſii *librum præ manibus habeo, in quo permulta digna invenio, & ſenſibus conſona; præcipuè verò Fibrarum Carnearum contextum circa Arterias, quem non ſemel in Aorta, præcipuè Bovis, rimatus ſum. Pro his igitur, & tuâ in me perennanti benevolentiâ, eximias reddo gratias. Plures epiſtolas (& fortaſſe libros) ad te datas intercidiſſe video, & præcipuè Domini* Mengoli *librum de* Anno, *Miniſtro cuidam Exc^mi Legati veſtri, elapſo anno* Londinum *profecti, commiſſum. Plura etiam, Ampliſſimi* Dodingtoni *ope tranſmiſſa, ad tuas deveniſſe manus non audio, ſicut nec poſtremas meas litteras, quibus exemplaria de* Ovo *me accepiſſe innuebam. Doctiſſimi* Grevii *Epiſtolam, ejuſdemq; librum Domino* Bocconio *traditum adhuc deſidero, & reliqua tanti Viri, quotieſcunq; luce fruentur, pergrata mihi ſunt futura.*

Sextus

Sextus jam excurrit menſis, ex quo Exc^mus Ablegatus, Venetiis *morans,* Anatomiam Plantarum *cum Iconibus recepit, ut tutâ occaſione ad Te tranſmitteret. Hanc tamen Tibi redditam fuiſſe necdum accepi. Valeas, quaq; ſoles humanitate & amore me proſequi ne deſinas.*

Dabam Bononiæ *d.* 5. Februarii, 1675.

X.

Clariſſimo viro

Domino HENRICO OLDENBURGIO

Societ. Reg. Angl. Secr.

MARCELLUS MALPIGHIUS *ſalutem.*

EN Tibi, Vir Clariſſime, Plantarum Anatomes pars potior, unà cum promiſſis Iconibus, ſeriùs quàm deſtinaveram tranſmiſſis, ita cogente adversâ meâ & aliorum valetudine. Invitus enim perpetuò ægrorum curationibus adſum, unde corporis & animi robur enervatur. Hanc igitur de Plantis Exercitationem, ſi lubet, Regiæ Societati *meo nomine humillimè offeres. Mihi ſat fuerit in hoc ſolùm demeruiſſe, quòd in re tam ardua tantorum Virorum mandatis obtemperare volui. Si fortè Exercitatio hæc, Sociorum judicio, luce fruatur, exoptarem, ut tranſmiſſa olim Epiſtola, * cujus exemplar hîc denuò inſertum habes, typis unà ederetur.*

Hæc epiſtola, ut patet, ſcripta fuit ante proximè prægreſſam, ſed per mare unà cum ipſo ſcripto Botanico tranſmiſſa fuit.

** Hæc ea eſt, quæ in hoc libro* Anatomes Plantarum idea *vocatur.*

Scio plura irrepſiſſe errata, quæ tuæ mihi perpetuò faventis benevolentiæ ope delenda venient. Reliqua circa Gallas, Vegetationem, & Radices, *cùm omnes icones necdum ſint in promptu, in aliud differo tempus.*

Doctiſsimi Domini Grevii *liber nondum ad meas devenit manus, cùm D.* Bocconius *adhuc in Belgio moretur. Libenter ipſius meditationes & obſervationes admirabor, mihiq; pergratæ erunt epiſtolæ, quas eum ad me dediſſe aſſeris.*

Exercitationis circa Pulli in Ovo generationem tranſmiſſa exemplaria triginta, favore Excellentiſsmi Equitis Finchii *elapſis menſibus recepi, tibiq; interim quas debeo gratias rependo. Famigeratiſsimi Domini* Boylii *librum noviſsimè acceptum necdum mihi licuit attentè perlegere, ipſiuſq; inventis perfrui; ingentem tamen Experimentorum Inventorumq; ſylvam conſpicio. Vale.*

Dabam Bononiæ *d.* 20. Auguſti 1674.

XI. *Celeberrimo*

XI.

Celeberrimo viro

Domino MARCELLO MALPIGHIO

Philoſopho & Medico Bononienſi.

HENRICUS OLDENBURG *Felicitatem.*

TEmperamentum lætitiæ meæ vix inveniebam, quando poſt exſpectationem quinque-meſtrem, anxiaſq; , ob infidi maris diſcrimina, mentis agitationes, precioſum tuum munus Philoſophicum manibus meis incolume tradebatur. Eodem die (Januar. ſcil. 28. 1675.) quo mercator Londinenſis datam de eo reddendo fidem liberabat, Ego Societati Regiæ, cætum publicum tunc celebranti, idipſum exhibebam. Illi, luſtratâ theſauri hujus præſtantiâ , tot tamq; egregiis Iconiſmis condecoratâ, unanimes decrevere, tum ut ſummas ipſorum nomine gratias Tibi remitterem, tum ut Opus ipſum typis ac fieri poſſet elegantiſsimis mandatum, toti orbi Philoſophico quantociùs exponerem: Adhæc, vota adjecêre flagrantiſsima, ut reliquum, quem innuis, ingenii tui feliciſsimi de Vegetatione proventum illibatâ valetudine perficere tibi concedatur.

Voluiſſem ſanè, Vir Clariſſime, hanc, quæ injuncta mihi nunc eſt, Encomiaſtæ tui provinciam, alii fuiſſe demandatam, qui clariore calamo dignum tuis meritis Elogium dixiſſet, eâq; ratione luculentos accendendæ virtuti ignes ſubjeciſſet. At quia ſic juſſêre, quibus refragari nefas ducebam, id ſolummodò dixerim; Exterorum, quod ſciam, neminem magis genuinum ſe Regiæ Societatis Alumnum præſtare, aut feliciori ingenio majorive induſtriâ ad nominis ſui immortalitatem contendere.

Cætera, hoc Tecum expendas velim, quod ſi tam præclara æſtimantur, quæ hactenus per partes edidiſti, quid futurum ſit, ſi quæ de hoc argumento elucubranda Tibi ſuperſunt, pari eruditione & ἀκριβείᾳ adornare ſatagas, adeoq; ex omnium nexu & complexione conſummatum opus in publicum emittas? Micabit id opus fulgentiſsimè, ac famæ nunquam intermorituræ decus certò certius Tibi conciliabit, totiq; penui Philoſophico augmentum locupletiſsimum adjiciet. Vale, Vir Naturæ Conſultiſsime, & Naturæ abdita penetrare gnaviter perge.

Dab. Londini 8 *Id.* Febr. *MDCLXXV.*

FINIS.

ERRATA.

PAg. 4. *Anatomiæ Plantarum*, l. 26. leg. *ſenſim* pro *ſeni*, p. 10. l. ult. leg. *igitur utplurimùm*, p. 25. l. ult. leg. *Roſarum* p. 41. l. 9. leg. *geranio*, p. 47. l. 34. leg. *ultra*, p. 62. l. 26. leg. *filtratione*, p. 71. l. 29. leg. *appenduntur*, p. 72. l. 20. poſt v. *exorti* dele *comma*. Pag. 7. *De Ovo Incubato*, l. 37. leg. *replebatur*. Epiſt. II. l. 22. leg. *ſtudia tua*. Ep. III. l. 13. leg. *lucem publicam*, Ep. V. l. 14. leg. *tranſmiſſam*.

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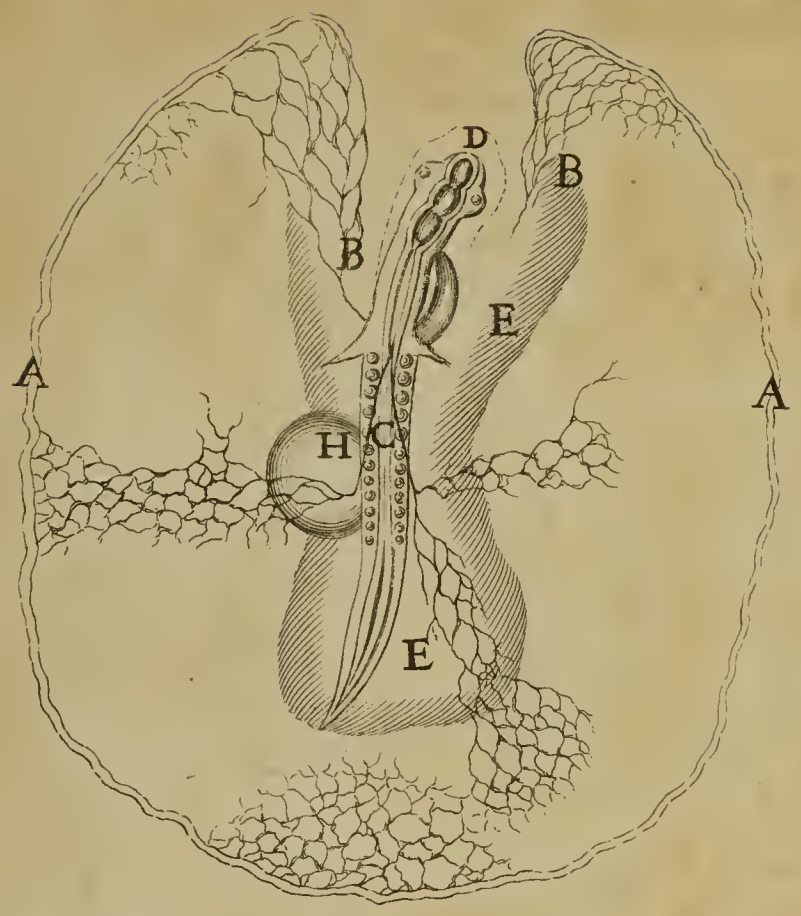

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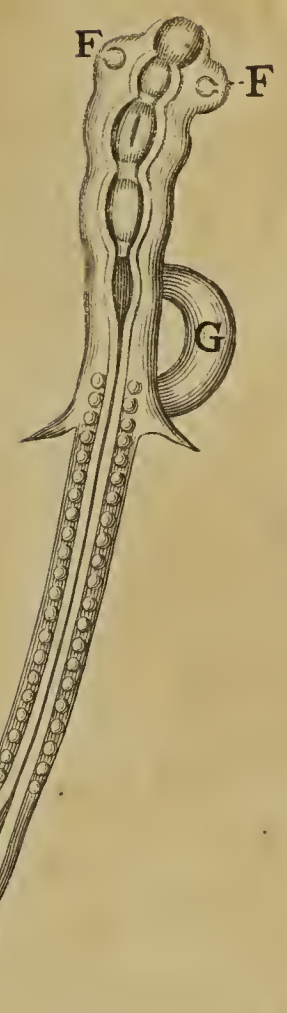

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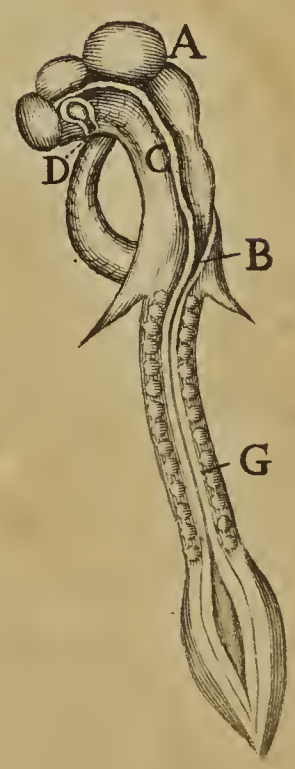

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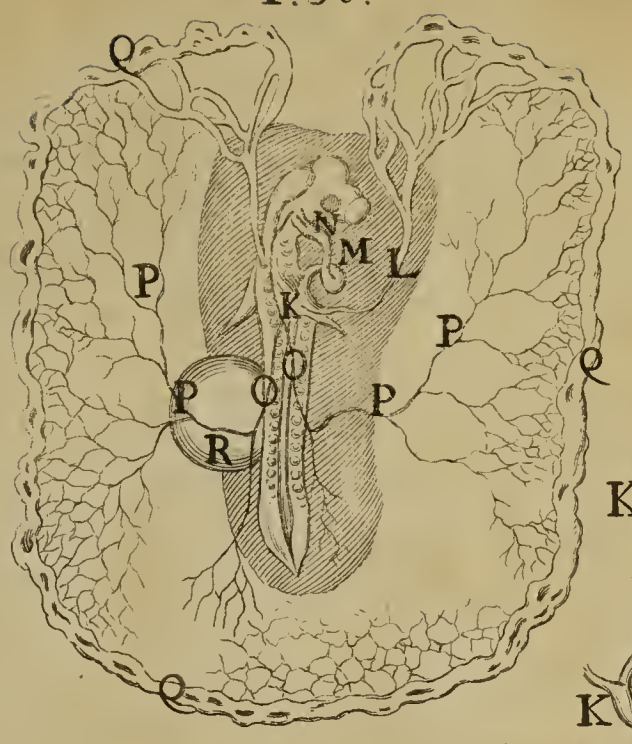

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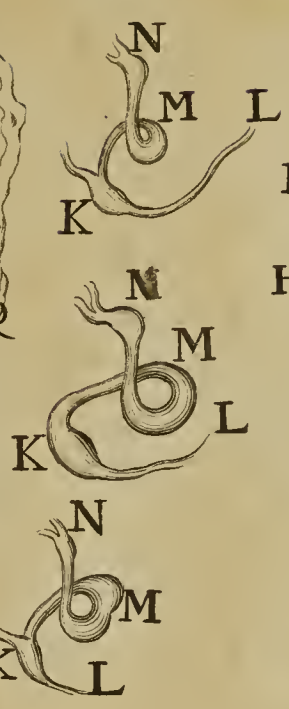

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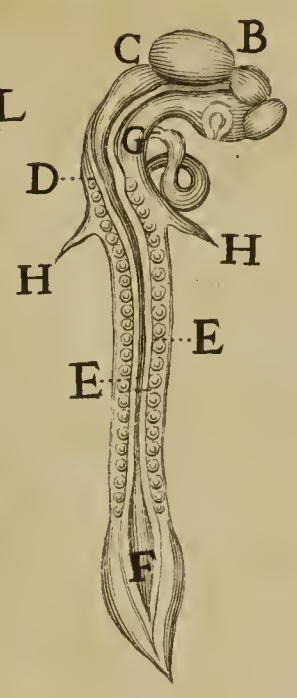

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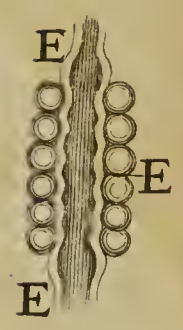

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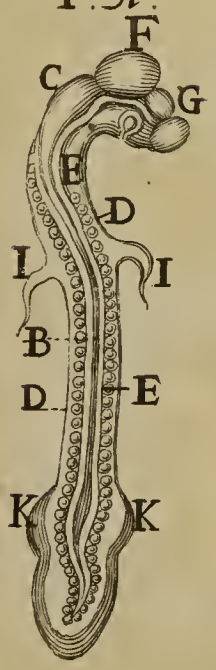

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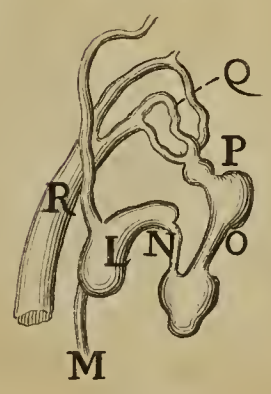

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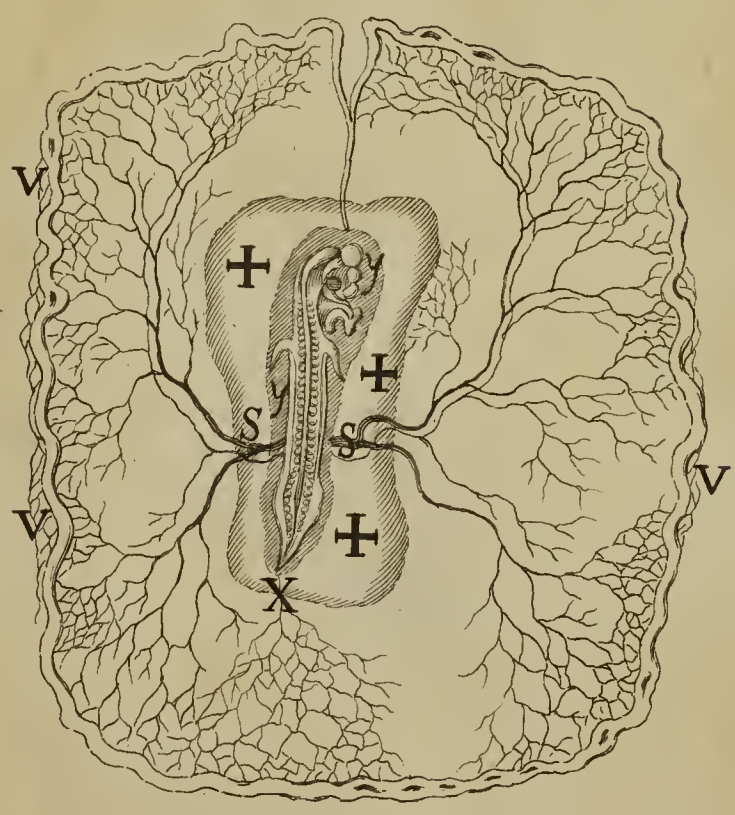

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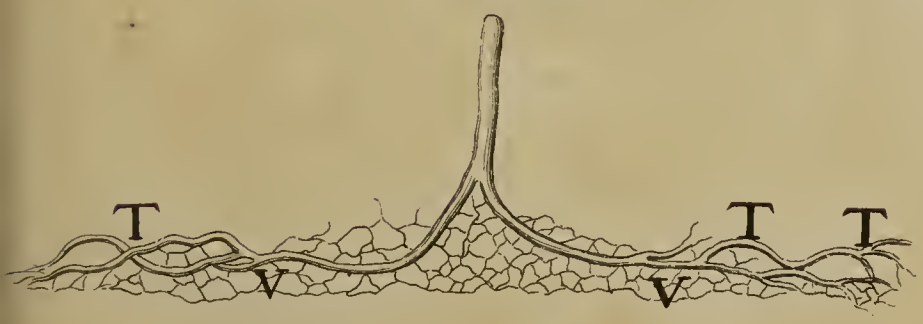

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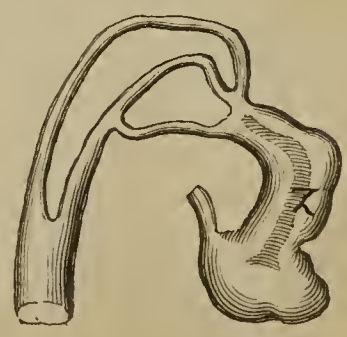

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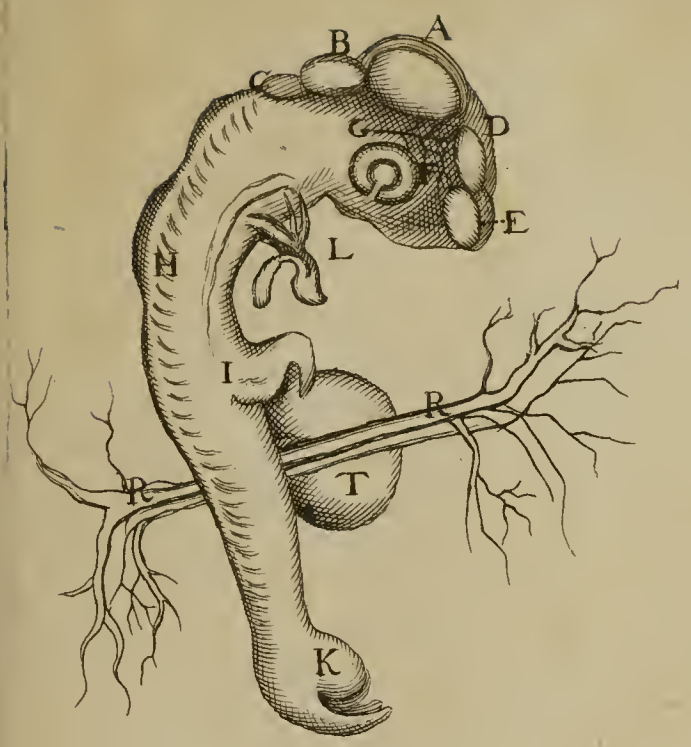

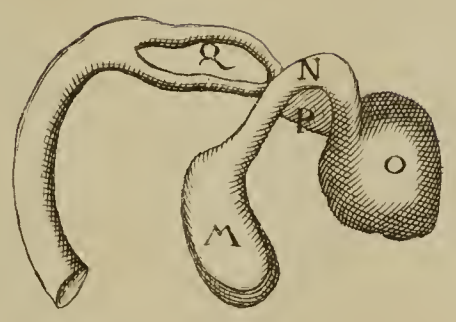

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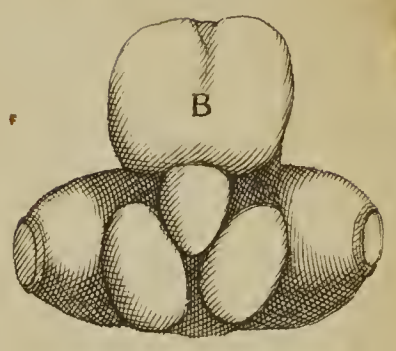

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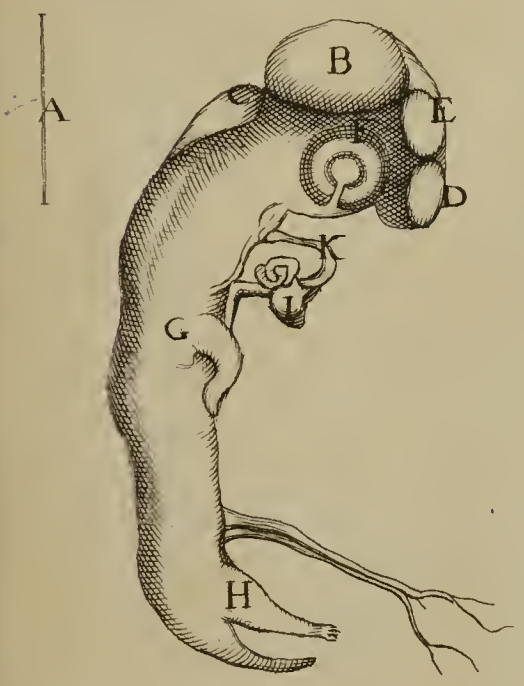

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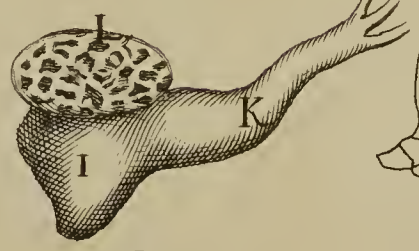

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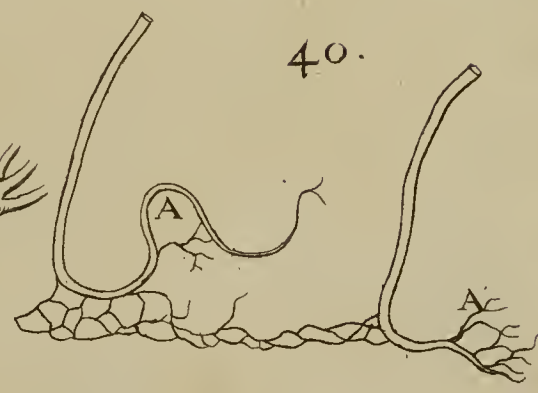

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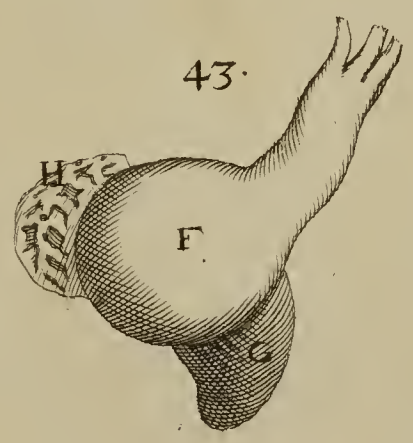

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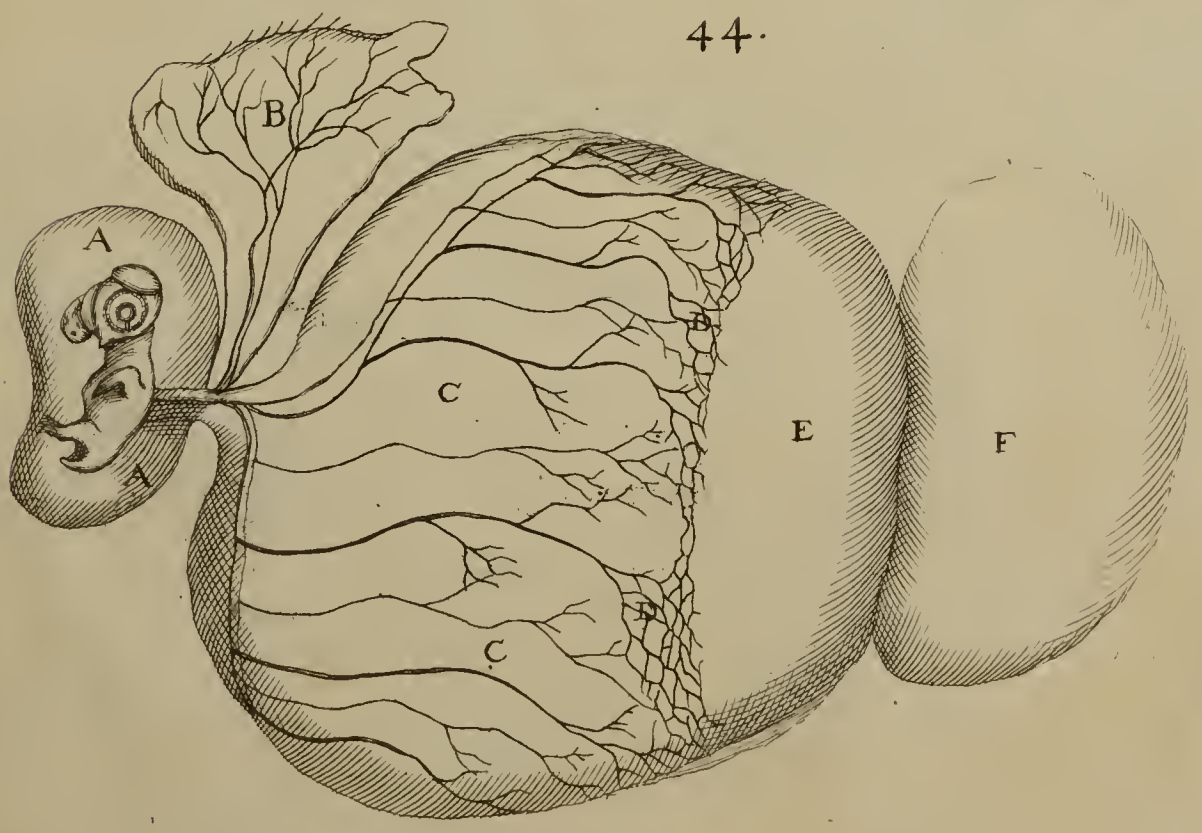

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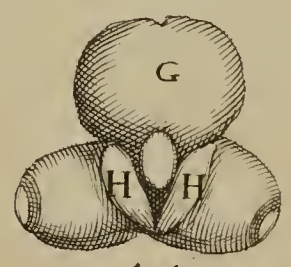

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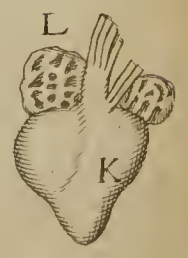

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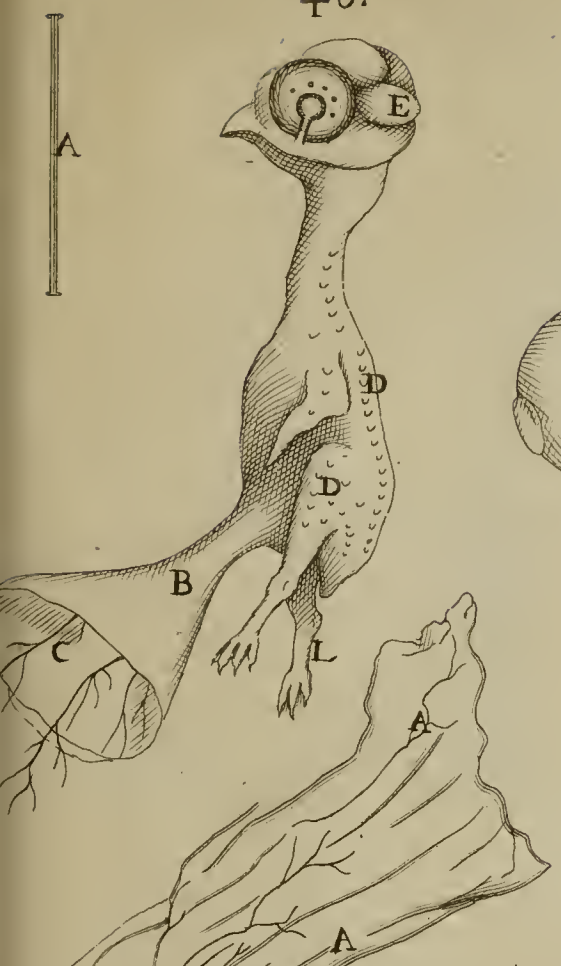

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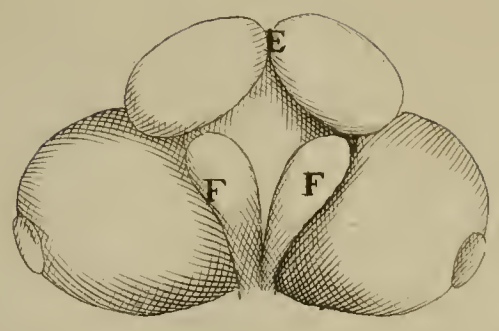

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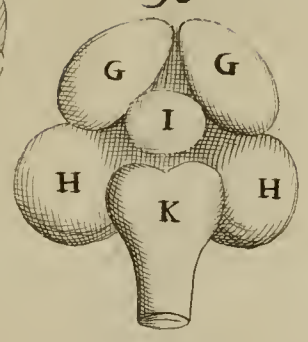

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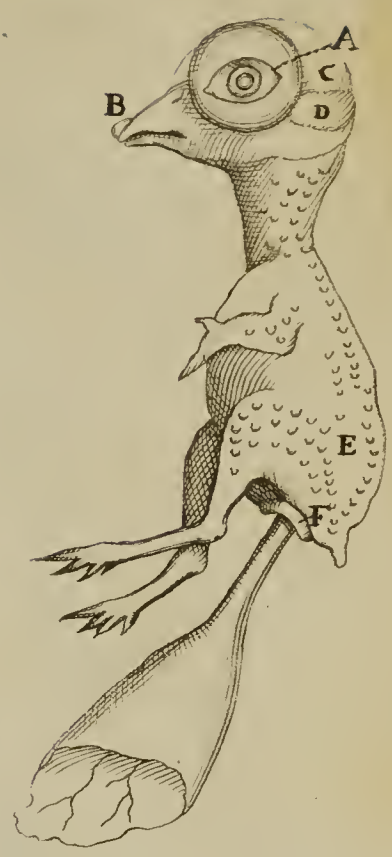

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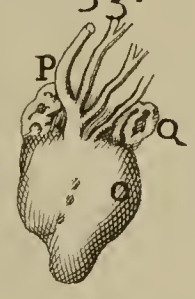

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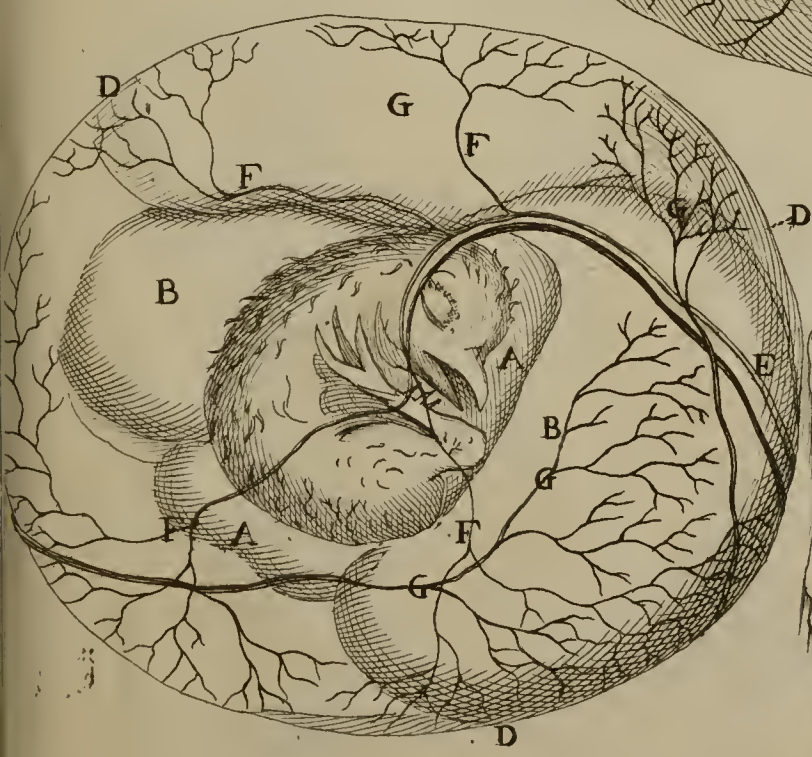

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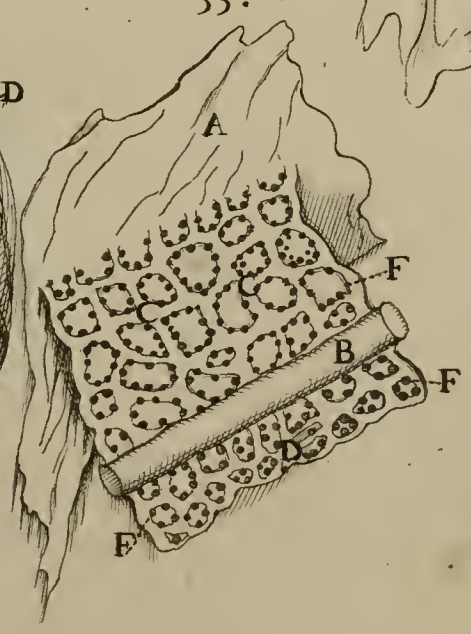

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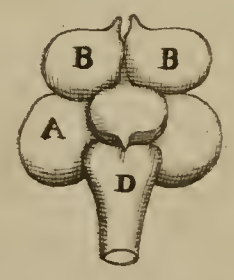

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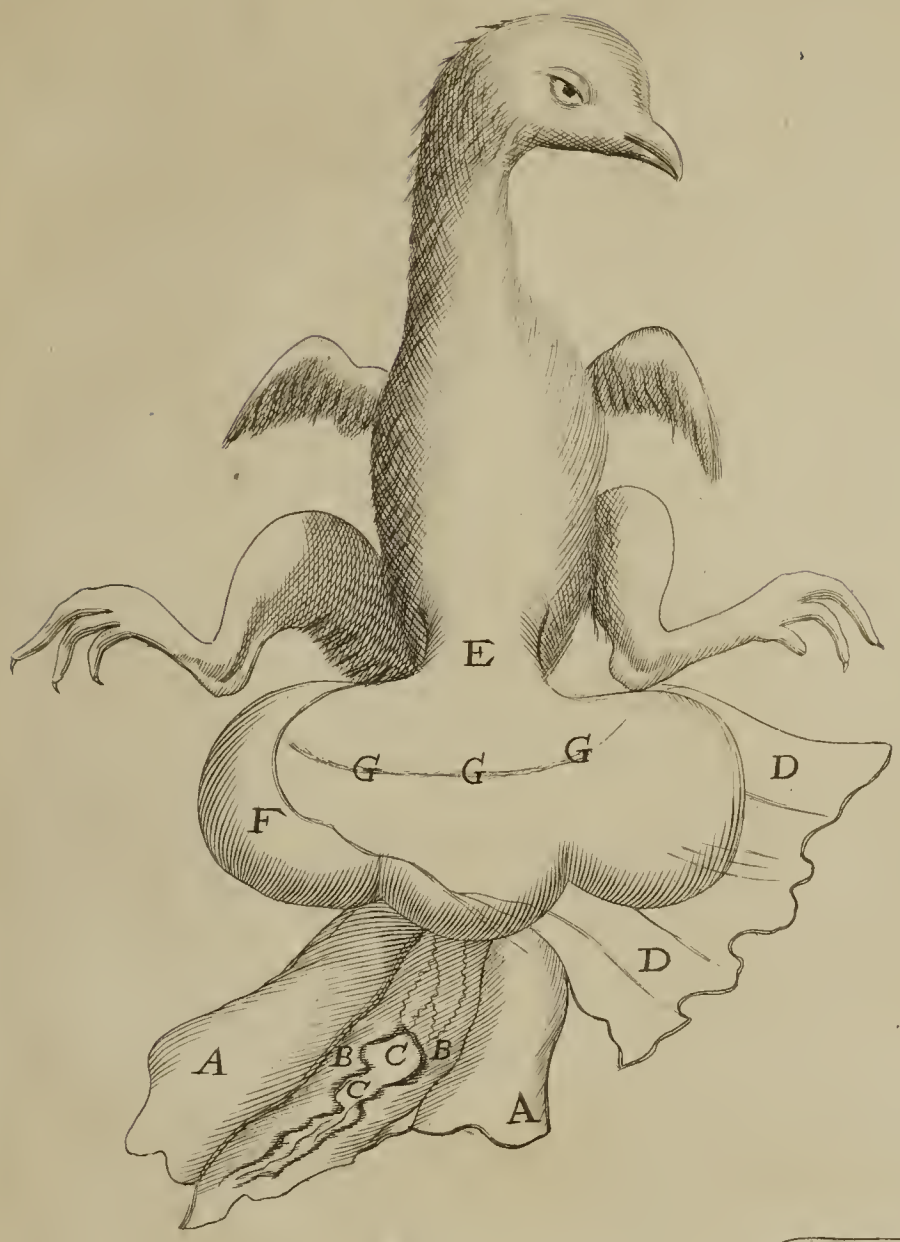

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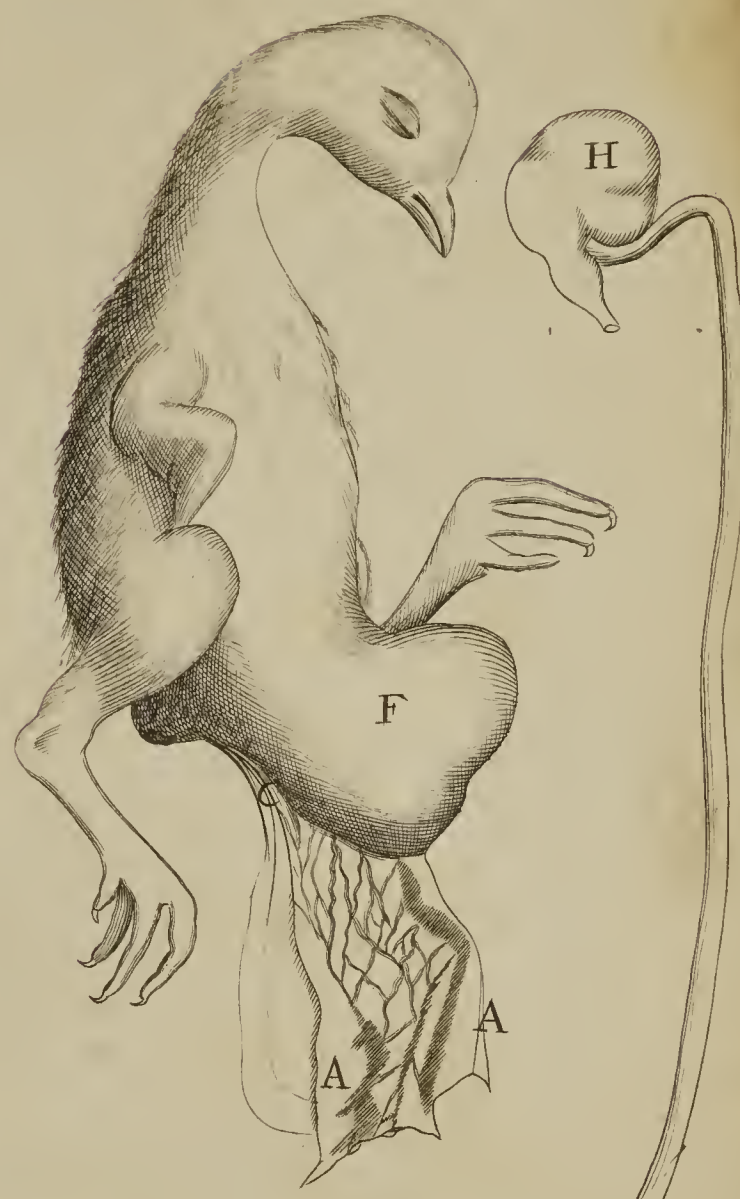

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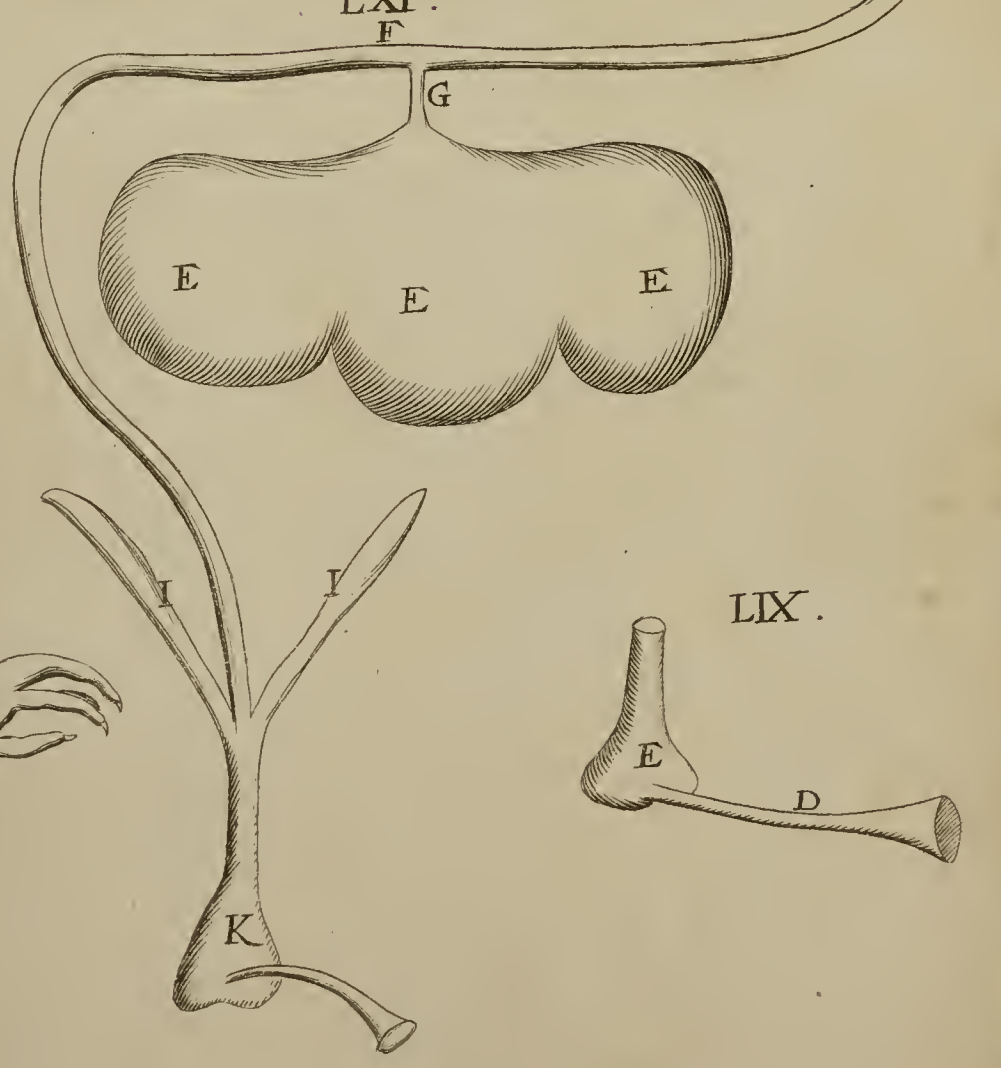

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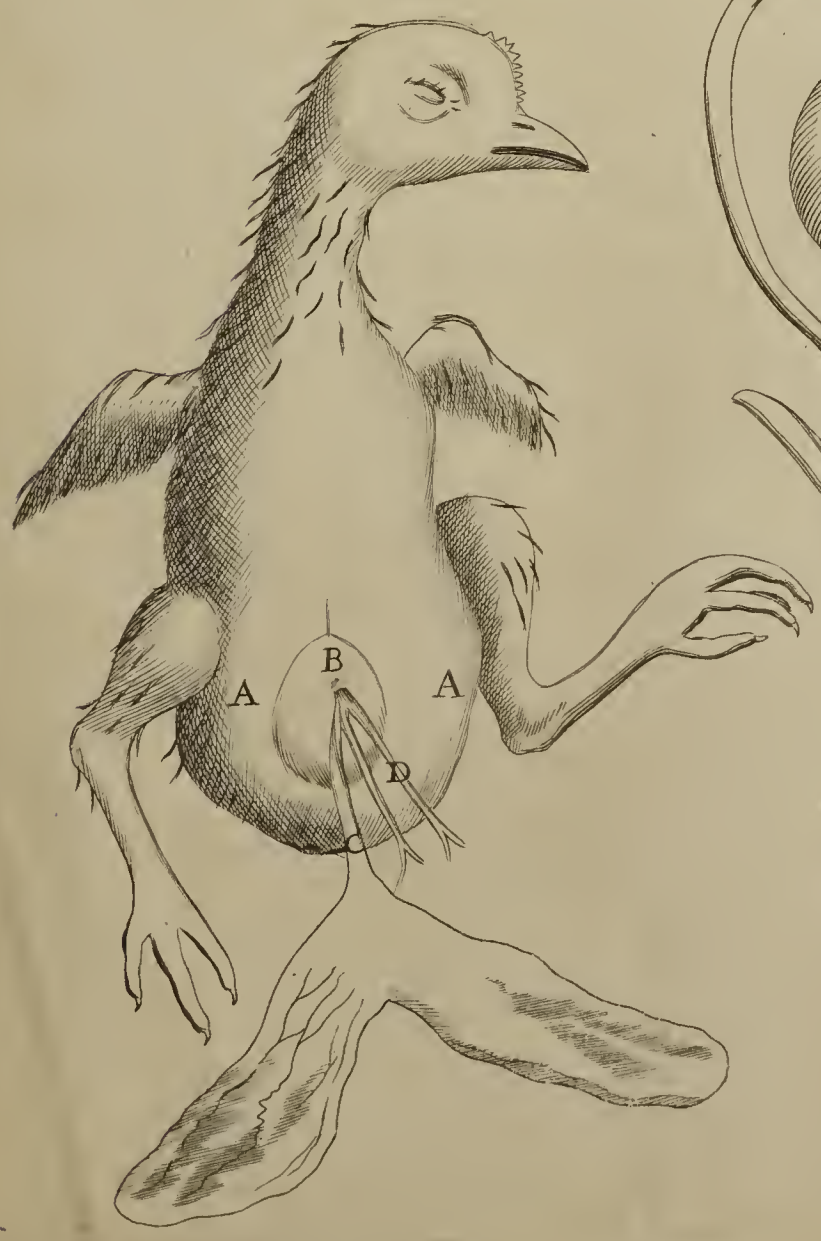

LIX.